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Acceptance Towards e-Learning Among University Students During Covid-19'S Movement Control Order

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Abstract: The implementation of e-learning is highly demanded during the Covid-19 pandemic outbreak. It has been developed to overcome barriers associated with time, space, or geographical location that prevent the students from attending an-on campus course. Overall, previous literature highlighted the benefits and disadvantages of e-learning among school and university students. However, limited studies have evaluated the acceptance level of university students towards e-learning during a restricted environment like a state of emergency like Movement Control Order (MCO) during the Covid-19 pandemic. Therefore, this study aims to explore the acceptance level towards e-learning based on different locations and years of study and to compare the mean difference of acceptance level towards e-learning during the Covid-19 movement control order. A total of 151 undergraduate physiotherapy students were recruited in this study. A quatitative approach was employed through a questionnaire as the research instrument. The findings revealed both urban and rural regions demonstrated moderate acceptance towards e-learning. Students from the first year until the fourth year also showed a moderate acceptance level towards e-learning. Nevertheless, there were no mean differences between locations and years of study with students' acceptance level towards e-learning. Thus, the acceptance towards e-learning among Physiotherapy students were not affected based on the years of study and geographical locations.
Keywords: acceptance, attitude, e-learning, location, years of study.

INTRODUCTION

The recent spreading of Covid-19, a novel virus, prompted every government in the world to impose lockdowns, physical distancing, avoiding face-to-face interaction, and restrictions on immigration (Kapasia et al., 2020). Thus, the implementation of online classes or e-learning at every educational institution is highly demandable. Malaysia is not excluded from the Covid 19 pandemic outbreak (Azlan et al., 2020). However, the success of e-learning implementation depends on the student and instructor's performance and interaction (Hassan & Bao, 2020). E-learning can be defined as education that includes electronic equipment and tools with the interactivity between the people involved in the learning process, such as among lecturers and students (Mahajan, 2018).

E-learning has been developed to overcome barriers associated with time, space, or geographical location that prevent the students from attending an-on campus course (Mamattah, 2016). To implement e-learning, three components are needed: technological tools, software, and the internet (Adams et al., 2018). The current e-learning system has been updated with the implementation of 3D simulations, computer programs, video and telephone conferencing, and real-time online discussion compared to decades before using televisions and overhead projectors in classrooms (Al-sammarraie et al., 2019). E-learning also provides flexibility in terms of time and location (Eryilmaz, 2015). Ahmad & Chua (2015) suggested that e-learning allows a faster transmission and updating of teaching and learning material and encourages interactive communication between lecturers and students. In addition, e-learning reduces the educational cost via the reuse of education, manifesting its cost-effectiveness advantage (Al-sammarraie et al., 2019).

Despite these advantages, a study by Chang, Hung, & Lin (2015) reported that students prefer a physical classroom as it provides a formal learning environment. Lack of face-to-face interactions due to the changes in the original learning environment may negatively influence student motivation towards e-learning (Chang, Hung & Lin, 2015). A study by Ullah (2017) reported that students prefer attending traditional classrooms due to feelings of isolation and loneliness when they were required to face a computer screen instead of having interaction with their lecturers and peers. In addition to

that, e-learning is technology-dependent, which requires certain devices with a minimum specification and high bandwidth to transfer course material (Al-sammarraie et al., 2019). Some students might not be able to access or own the whole set of technologies due to cost and geographical constraints (Mamattah, 2016).

Moreover, some of the e-learning tools and software have unsustainable characteristics. For example, some of the software might not be compatible with certain tools (Al-sammarraie et al., 2019). Apart from that, e-learning still depends on human support to guide the student (Al-sammarraie et al., 2019). Students with a lack of information technology (IT) skills sometimes might not be able to enjoy the e-learning and updates in technologies (Al-sammarraie et al., 2019; Adams et al., 2018). Lean et al. (2018) proposed that poor network connection is the primary barrier to e-learning. This is because slow network connection speed may discourage students from studying online.

Based on the mentioned e-learning disadvantages such as being separated physically from the university and peers, the student might react differently towards e-learning. Furthermore, not all students have been equipped with the proper tools and IT skills (Ngampornchai & Adams, 2016). In some rural areas in Malaysia, some of the technology infrastructure and information related to e-learning and IT skills are not well developed due to lack of computers and software availability and incompatibility between software and hardware (Wong et al., 2016). Besides, studying a physiotherapy course requires a student to acquire specific practical skills and fulfill certain clinical posting hours. However, the Covid-19 lockdown has prevented universities and other educational institutions from conducting face to face teaching and learning activities which limit the student's opportunity to learn about certain practical skills and attend clinical posts. It is essential to explore how physiotherapy students are coping with e-learning during the Covid-19 pandemic lockdown. Therefore, this study aims to explore the acceptance level of undergraduate Physiotherapy students from UiTM towards e-learning based on different locations and years of study and to compare the mean difference between the acceptance level towards e-learning and locations and years of study during the Covid-19 movement control order.

METHODOLOGY

The quantitative approach was employed through the use of a self-administered close-ended questionnaire adapted from Lim, Hong, Tan, (2008) as the study instrument. All questions were transferred onto a Google Form. The first part collected the subjects' demographic information. The second part collected data on factors of acceptance using a numerical 5-point Likert scale; strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). There were four factors overall-technology and system, interactive applications, instructors' characteristics and students' behavior and attitude.

This cross-sectional survey was conducted during the academic year of 2020-2021 among undergraduate physiotherapy students of Universiti Teknologi MARA (UiTM). They were approached through social media. Subjects recruited in this study are full-time undergraduate physiotherapy students pursuing a Bachelor's Degree (Hons) or a Diploma in Physiotherapy at UiTM Puncak Alam and UiTM Bertam. Subjects recruited were from the first until the fourth year of study and are able to understand English. Part-time students are excluded from this study.

The factors in this questionnaire were tested reliable since the Cronbach's Alpha coefficient ranges from 0.782 to 0.851 (Lim, Hong & Tan, 2004). A value of Cronbach's Alpha that is equal or greater than 0.7 (Sakarji et al., 2019) indicates that this research instrument was appropriate and reliable. Data was analysed using SPSS software version 20 (SPSS 20). Demographic data was calculated using descriptive statistics. Meanwhile, independent t-test was used to evaluate the level of acceptance towards e-learning and mean differences between the two locations. The one-way analysis of variance (ANOVA) was used to compare the mean difference between Physiotherapy acceptance levels towards e-learning and years of study.

RESULT

Table 1 shows the demographic data of the 151 study subjects. All subjects were from the Physiotherapy department in UiTM. A majority of the subjects are female, with 86.8%, and the male gender formed the minority, at 13.2%.

The mean age of the total subjects was 21.78. 72.2% were students from the Bachelor's Degree while the other 27.8% were Diploma students. The subjects are students from the first-year (22.5%), second-year (21.9%), third-year (23.2%), and fourth year of study (32.5%). The number of subjects in terms of the location was almost equal between the urban (49.0%) and rural (51.0%) areas.

Table 2 shows the descriptive statistics according to the subject's location. 44.4% had above 10 years of experience in using the internet, 35.1% had 7 to 10 years, 15.9% had 4 to 6 years, and only 4.6% of them had 1 to 3 years of experience. Half of the students from the urban areas have above 10 years of experience while only 38.9% students from rural areas have above 10 years of experience. Most of the students (66.2%) reported having moderate internet accessibility at home, 29.1% have strong internet accessibility, and 4.6% have low internet accessibility. 44.6% of urban students have strong accessibility compared to rural students with only 14.3% claiming to have strong internet accessibility at home. As for access tools, 51.7% use mobile data, 43.7% use modem, and 4.6% use local area connection. More than half (59.5%) of students from the urban areas use modems to access the internet while the majority (68.8%) from rural areas purchased mobile data to connect to the internet. Almost all of the participants 95.4% claimed to know e-learning, while the rest (4.6%) do not know about e-learning. Only 1.4% students from the urban areas claimed to know nothing about e-learning, while 7.8% of the rural students have no knowledge on e-learning.

Particularly for each factor, students had shown a moderate level of acceptance for the factor "technology and system" with a mean of 3.59 (Table 3). In particular, the system allowed easy access to information (4.02), the configuration color and background were clear and harmonious for the system (3.82), there was information credibility in the system (3.77), the guidance screen was clear and easy to use (3.87), IT infrastructure was reliable and secure (3.71), there was adequate investment in infrastructure to support electronic performance (3.66), the screen layout and design were appropriate (3.90), they were rarely disconnected during online tutorial (3.05) and satisfied with browsing speed (3.23) but rated 2.90 for the question "I do not experience problems while navigating".

As shown in Table 4, students rated a moderate level of acceptance

towards e-learning in terms of interactive applications with a mean of 3.51. They thought sharing knowledge through online discussions was a good idea (3.58) and online discussions enabled them to exchange ideas and comments (3.52). In addition, they also gained benefit from using interactive applications (3.56), were able to ask questions and receive answers (3.58), felt that browsing classmates' works helped to reflect own shortcoming (3.72), thought sharing knowledge through online discussion was time consuming (3.40), had discussions with their course-mates via e-learning system (3.65), thought uploading coursework was easy (3.46), thought browsing classmates' works helped to improve the quality of own work (3.68), thought uploading coursework was an appropriate method (3.74), browsed peers' feedback of most of their classmates (3.34) but rated 2.90 for the questions "able to concentrate on the quality of learning".

Table 5 revealed that students also had a moderate level of acceptance towards e-learning in the factor of "instructors' characteristics" with a mean of 3.85. They agreed that : their instructors' knowledge on using the internet technology affected efficiency of online learning (4.04), were friendly and approachable (3.97) and were easily contacted (3.93). Additionally, their instructors : explained how to use the website at the beginning of the semester (3.65), encouraged student interactions (3.99), provided sufficient learning resources online (3.89), solved emerging problem efficiently (3.86), provided fast feedbacks to queries in the discussion forum (3.89) and replied e-mail queries rapidly (3.63). They were also enthusiastic in teaching and explaining via the web (3.91) but did not intervene unless students asked for the correct answer (3.64).

The scores in Table 6 on factors related to students' behaviors and attitudes show that students demonstrated a moderate level of acceptance towards e-learning with a mean of 3.58. They believed in their capability to interact with technology (3.72) and ability to cognitively engaged in doing e-learning activities (3.40). They were also willing to participate in e-learning activities (3.48), had the initiative and motivation to learn and use the system (3.56), had high level of self-confidence in using the system (3.52) and were satisfied with the time and place flexibility of the systems (3.46). However, they were anxious in completing their studies (3.94).

An independent t-test was calculated to measure the level of acceptance

towards e-learning and the mean difference between locations while ANOVA was used to calculate the level of acceptance and the mean different between years of studies, as shown in Table 7. The overall mean score of 1.0 to 2.9 indicates low level, 3.0 to 3.9 moderate level, and 4.0 to 5.0 high level of acceptance towards e-learning (Lim, Hong, Tan, 2008). From the table, the acceptance level towards e-learning among students who lived in urban areas was slightly higher than those in rural areas, (3.67) and (3.58), respectively. These indicate that urban and rural regions demonstrated a moderate acceptance towards e-learning. However, there was no significant difference between the mean acceptance towards e-learning in urban and rural areas ($p= 0.154$). Table 8 shows that the subjects from the first until the fourth years of study had moderate levels of acceptance with the first-years having a score of 3.68, second-years with 3.67, third-years with a 3.64 and followed by the fourth-year students with 3.61. However, the analysis of variance showed that years of study on students' acceptance level was not significant, since the p-value was 0.885.

Table 1: Subjects' characteristics

Variable	n	%	Min	Max	Mean ± SD
Age			18.0	25.0	21.78± 1.74
Gender					
Male	20	13.2			
Female	131	86.8			
Level of study					
Bachelor's Degree	109	72.2			
Diploma	42	27.8			
Year of study					
First-year	34	22.5			
Second-year	33	21.9			
Third-year	35	23.2			
Fourth-year	49	32.5			
Number of courses taken			2.0	9.0	6.35± 2.57
Location					
Urban	74	49.0			
Rural	77	51.0			

Table 2: Demographic data based on location

Variable	N	%	Urban (n)	%	Rural (n)	%
Years of experience in using the internet						
1-3 years	7	4.6	3	4.1	4	5.2
4-6 years	24	15.9	10	13.5	14	18.2
7-10 years	53	35.1	24	32.4	29	37.7
Above 10 years	67	44.4	37	50.0	30	38.9
Internet accessibility at home						
Strong	44	29.1	33	44.6	11	14.3
Moderate	100	66.2	40	54.1	60	77.9
Low	7	4.6	1	1.3	6	7.8
Availability of access tool						
Modem	66	43.7	44	59.5	22	28.6
Local area connection	7	4.6	5	6.8	2	2.6
Mobile data	78	51.7	25	33.7	53	68.8
Knowledge on e-learning						
Yes	144	95.4	73	98.6	71	92.2
No	7	4.6	1	1.4	6	7.8

Table 3: Response to factor of acceptance towards e-learning: Technology and system

Technology and System	Mean ± SD	Min	Max
The system allows easy access to information	4.02 ± 0.73	2.00	5.00
The configuration colour and background are clear and harmonious for the system	3.82 ± 0.71	2.00	5.00
There is information credibility in the system	3.77 ± 0.72	2.00	5.00
The guidance screen is clear and easy to use	3.87 ± 0.68	2.00	5.00
The IT infrastructure is reliable and secure	3.71 ± 0.72	2.00	5.00

There is adequate investment in infrastructure to support electronic performance	3.66 ± 0.75	2.00	5.00
The screen layout and design are appropriate	3.90 ± 0.67	2.00	5.00
I am rarely disconnected during online tutorial	3.05 ± 1.16	1.00	5.00
I am satisfied with the browsing speed	3.23 ± 1.02	1.00	5.00
I do not experience problems while navigating	2.90 ± 1.14	1.00	5.00
Overall	**3.55 ± 0.47**		

Table 4: Response to factor of acceptance towards e-learning: Interactive applications

Interactive applications	Mean ± SD	Min	Max
I think sharing knowledge through online discussions is a good idea	3.58 ± 0.87	1.00	5.00
Online discussions enable students to exchange ideas and comments	3.52 ± 0.90	1.00	5.00
I benefit from using interactive applications	3.56 ± 0.79	1.00	5.00
I am able to ask questions and receive answers	3.58 ± 0.83	1.00	5.00
Browsing classmates' works helps me reflect on my shortcomings	3.72 ± 0.76	1.00	5.00
I think sharing knowledge through online discussions is time consuming	3.40 ± 0.87	1.00	5.00
I am able to concentrate on the quality of learning	2.90 ± 0.97	1.00	5.00
I have discussions with course mates via the e-learning system	3.65 ± 0.90	1.00	5.00
Uploading coursework is easy	3.46± 0.90	2.00	5.00
Browsing classmates' works helps improve the quality of my own work	3.68 ± 0.79	1.00	5.00
Uploading coursework is an appropriate method	3.74 ± 0.75	2.00	5.00
I browse the peer feedbacks of most of my classmates	3.34 ± 0.87	1.00	5.00
Overall	**3.51 ± 0.52**		

Table 5: Response to factor of acceptance towards e-learning: Instructors characteristics

Instructors' characteristics	Mean/SD	Min	Max
The instructors' knowledge on using the internet technology affects the efficiency of online learning	4.04 ± 0.74	2.00	5.00
The instructors are friendly and approachable	3.97 ± 0.70	2.00	5.00
The instructors are easily contacted	3.93 ± 0.71	2.00	5.00
The instructors explain how to use the website at the beginning of semester	3.65 ± 0.81	1.00	5.00
The instructors encourage student interactions	3.99 ± 0.72	2.00	5.00
The instructors provide sufficient learning resources online	3.89 ± 0.73	2.00	5.00
The instructors solve emerging problems efficiently	3.86 ± 0.72	2.00	5.00
The instructors provide fast feedback to queries in the discussion forum	3.89 ± 0.75	1.00	5.00
The instructors are enthusiastic in teaching and explaining via the web	3.91 ± 0.75	2.00	5.00
The instructors reply email queries rapidly	3.63 ± 0.81	1.00	5.00
The instructors do not intervene unless students ask for the correct answers	3.64 ± 0.75	1.00	5.00
Overall	**3.85 ± 0.53**		

Table 6: Response to factor of acceptance towards e-learning: Students' behaviours and attitudes

Students' behaviour and attitudes	Mean ± SD	Min	Max
I am anxious in completing my degree	3.94 ± 0.93	1.00	5.00
I belief in my capability to interact with technology	3.72 ± 0.79	2.00	5.00
I am cognitively engaged in doing the e-learning activities	3.39 ± 0.76	1.00	5.00
I am willing to participate in e-learning activities	3.48 ± 0.86	1.00	5.00
I have the initiative and motivation to learn and use the system	3.56 ± 0.84	1.00	5.00

I have a high level of self-confidence in using the system	3.52 ± 0.73	2.00	5.00
I am satisfied with time and place flexibility of the system	3.46 ± 0.85	1.00	5.00
Overall	**3.58 ± 0.47**		

Table 7: Acceptance level towards e-learning based on locations

Variable	Rural (n = 74) Mean± SD	Rural (n = 77) Mean± SD	Mean diff. (95% CI)	t-stats (df)	P-value
Acceptance	3.67± 0.42	3.58± 0.37	0.09(-0.04, 0.22)	1.43 (149)	0.154

Table 8: Acceptance level towards e-learning based on years of study

Variables	**n**	**Mean±SD**	**F-stats (df)**	**P value**
Year of study				
First-year	35	3.68± 0.36	.216 (3;147)	.885
Second-year	31	3.67± 0.47		
Third-year	35	3.64± 0.38		
Fourth-year	50	3.61± 0.43		

DISCUSSION

The findings show that students who lived in urban areas have longer years of experience (more than 10 years) of using the internet and only one student claimed to have no knowledge on e-learning compared to the students living in the rural areas, with seven students having no idea on e-learning. Besides, internet accessibility also seemed to be stronger in urban areas. The majority of the students in rural areas experienced moderate internet accessibility at home. In terms of access tools, most students from urban areas used modems to connect to the internet followed by mobile data. Meanwhile, those in the rural areas tended to rely on mobile data.
According to Azlan, et al., (2020), the rural areas in Malaysia had comparatively lower quality of internet connectivity compared to those who lived in the urban areas. Some of them with poverty issues had to depend

completely on prepaid mobile internet data plans (Azlan, et al., 2020). Even though private telecommunication companies had collaborated with the Malaysian government to offer 1 Gigabyte free broadband data for the use of e-learning, students still found the data was insufficient especially for lectures using platforms such as Google Meet, Zoom or Webex (Chung et al., 2020). The limited internet access might interfere with the process of e-learning, causing students to not receive instructions properly (Hasan & Bao, 2020) and delay the time for the task submission (Selvanathan et al., 2020). Hence, it is believed that students in urban areas are most likely to gain more benefits of e-learning than those in rural areas (Selvanathan et al., 2020).

This study also attempted to identify the level of the acceptance towards e-learning among students in rural and urban areas and to explore if there is any significant difference between those two locations. Generally, our findings show that students in rural and urban areas have a moderate level of acceptance towards e-learning with a slightly higher mean in urban areas as compared to rural areas. In addition, a comparison between mean years of study on students' acceptance level was also carried out. Students from the first year until the fourth year showed a moderate acceptance level towards e-learning. However, the means of acceptance between locations and years of study were not significantly different. These findings were supported by Thakkar et al., in 2017 who found no statistically significant difference in the positive attitude towards e-learning between rural and urban engineering students during a normal situation. A recent study done during the pandemic by Malkawi (2020) observed high and positive satisfaction levels and attitude of undergraduate students for both locations but they do not significantly differ between the two areas. In addition, similar findings were identified in high school students. Students' perception in rural areas was relatively high as in urban areas and no significant difference was found except for the students in urban areas that tended to feel more at ease when utilizing online learning as compared to the rural students (Sulisworo et al., 2020). However, there were studies that obtained the opposite results. Alipio in 2020 stated that students in urban regions were more ready for e-learning during the pandemic than in rural areas. Urban students even performed better than students in remote areas in terms of learning outcomes (Panyajamorn et al., 2018).

Overall, the students rated the highest moderate mean for instructors' characteristics factor (3.85) among all three factors of acceptance towards e-learning which might indicate instructors' characteristics as the biggest contributor for the moderate level. The second highest was on behavior and attitude (3.58). Eventhough the students believed in their ability to deal with technology, they were still very concerned about graduating successfully. The third highest was on technology and system (3.55) and followed by interactive application (3.51). They perceived that lecturers' knowledge influenced a successful e-learning process. Their lecturers were friendly and readily available when contacted. They were passionate in teaching and explaining and encouraged students' active communication. Furthermore, they also agreed the system allowed them to get credible information easily and were satisfied with the setting of the system. Nevertheless, they had trouble concentrating on the quality of learning and were still inseparable from being interrupted while navigating. They found that browsing classmates' works using the interactive application was beneficial to reflect their shortcomings and improve the quality of work.

Puljak et al. in 2020 who discovered positive results in health sciences students' attitude and concerns towards e-learning, also found that most of the students were generally satisfied with their instructors. They gave fast feedback, gave instructions that were tailored to e-learning, showed effort to ensure their students could follow the new learning method and verified their students' understanding through feedback. In addition, the lecturers provided adequate teaching material and adjusted well to the e-learning method. Correspondingly, students who positively accepted e-learning would acknowledge instructors with good skills as enablers of e-learning (Ibrahim et al., 2021). The difficulty to interrupt the lecturers during class would cause the students to have high dissatisfaction towards e-learning (Selvanathan et al., 2020). Hence, it can be assumed that the students' perception towards e-learning was strongly influenced by the instructors.

The findings suggested that physiotherapy students were positively engaged with the new method of learning even though they were anxious to finish their study. Still, this current study did not evaluate how they accepted their practical sessions or clinical practices through online mediums. Puljak et al., 2020 stated that the majority of health sciences students are concerned about the consequences of inadequate or lack of practical education for their

future job preparedness. Studies performed among medical students showed that they have a moderate level of acceptance (Ibrahim et al., 2021) even when encouraged to shift to online learning for both preclinical years and also clinical sciences to fit with the current situation (Anwar et al., 2020). However, the study was conducted at a private medical college where the students belong to a higher socioeconomic status (Anwar et al., 2020). In contrast to this statement, medical students in a study by Ibrahim et al., (2021) still recognized clinical teaching was challenging and not suitable through e-learning medium. An opposite finding by Subedi et al., (2020) showed that nursing lecturers and students did not agree with e-learning because both suffered from obstacles brought about by internet problems during class.

In general, the physiotherapy students seemed to have adjusted well to the e-learning method since the survey was distributed in the second semester of e-learning implementation. The acceptance towards e-learning among our physiotherapy students was not affected based on their geographical location or years of study. However, they still had trouble navigating and concentrating during e-learning class. They even had a high level of anxiety to complete their study which could be related to the lack of physical classes. Hence, a further study on psychological distress among physiotherapy students should be done.

CONCLUSION

The Covid-19 pandemic outbreak has interrupted the educational process worldwide. Hence, people rely heavily on online platforms and e-learning as an optimal solution to ensure the continuity of the teaching and learning process. Students' acceptance towards e-learning should be considered to allow the authorities to enhance the new pedagogy. It was found that although rural areas in Malaysia have lower internet connectivity, the students still accept to opt for the current situation despite being anxious about finishing their studies through e-learning. This indicates that policymakers and authorities can eliminate the uncertainty regarding e- learning in students in urban areas and should focus on the students' perspective as a whole. Nevertheless, improvement in terms of teaching skills should be done to optimize the e-learning process.

Instructors or lecturers are urged to use their creativity in delivering lectures

by using new and modern technology during this pandemic. Hence, to use e-learning in the 'new normal' to achieve learning outcomes established by institutions, instructors must have basic IT background knowledge. The study recommends that instructors involved in emergency online education should create channels for student-instructor and student-student interaction. Therefore, this interaction will reduce students' feelings of isolation while also boosting their engagement and confidence in online learning.

This study has its limitations as well as it concentrated on the UiTM physiotherapy students only. Future studies should include other education institutions to diversify the result. A study in the educators' take should also be considered in order to have their perspective on e-learning. Besides, this study is limited to online quantitative surveys using a close-ended questionnaire. Therefore, in future investigations, it is recommended that interviews or open-ended questionnaires be used to find further explanations to the other perspectives of this study, as suggested.

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Student Perspective on Distance Online Learning Experience During the COVID-19 Pandemic in Undergraduate Pharmacy Program in UiTM: Pharmacology of CNS Drugs

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Abstract: The method of teaching and learning (T&L) has changed radically due to the COVID-19 pandemic, globally. Schools and universities had to adapt to a new T&L experience by moving into hybrid learning or fully electronic online mode. As for the third-year pharmacy students in UiTM, the Faculty of Pharmacy employed 100% online distance learning (ODL). Hence, this study aims to evaluate the third-year pharmacy student ODL experience during the COVID-19 pandemic on one of the core subjects, Pharmacology of Central Nervous System (CNS) Drugs. The online survey was distributed to students at the end of the semester. Multiple questions made up a score that reflects their perspective on the subject relevant to the ODL experience. The survey was voluntary, and all data were collected and recorded via google forms. The response rate was about 74% (n=186). The results' analysis revealed some variable responses. The ODL experience poses many challenges not only to the students but lecturers alike. The burden of completing assignments and at the same time coping with the current situation of an unconducive environment at home with internet instability has pushed the students to almost a breaking point. Hence, a more structured plan needs to be implemented to ensure the students have the best for their academic development to pursue their professional careers without compromising their soft skills.

Keywords: COVID-19, pharmacy, pharmacology, online distance learning, online platforms

INTRODUCTION

Most of the academic institutions around the world have adopted some forms of electronic learning many years ago as a supportive and efficient tool to their face-to-face classes and as a blended-learning method to student assignment submission and the conducting of exams, with comparable quality to traditional learning but at lower costs and higher convenience for students and instructors (Gherhes et al., 2021). The current Coronavirus disease for 2019 (COVID-19) pandemic situation caused massive chaos, and the rapid spread of the novel Severe Acute Respiratory Syndrome-Coronavirus 2 (SARS-COV-2) virus worldwide has disrupted many areas including education (García-Morales et al., 2021; Marinoni et al., 2020). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO) most recent reports, more than 180 countries have closed their educational institutions and suspended physical classes on campus in response to health authorities' advice and/or mandate that come in recognition of the crucial role of social distancing and programmed lock-downs in minimizing the spread of the virus among community members. Globally, these closures impacted more than 60% of the students at different educational levels (UNESCO, 2021). This pandemic may influence negatively both cognitive and non-cognitive skills acquisition and may have significant long-term consequences in addition to the short-term ones (Di Pietro et al., 2020). Almost all countries have moved their courses and teaching programs delivery to a fully ODL mode. Pharmacy and other health professions educations rely on different traditional and student-centred teaching methodologies involving didactic lectures and seminars, industrial and practical training, and laboratory sessions, as well as problem-based or case-based techniques such as small group discussions and hospital attachments (Galvao et al., 2014; Imanieh et al., 2014; Meng et al., 2019; Nouri AI et al., 2020; Mohamed Ibrahim, 2018). Didactic lectures can be conducted in either a traditional classroom (face-to face-learning) or through virtual online learning if it is the only available method of teaching, that is when academic institutions shift to virtual platforms exclusively (Leiber, 2019). However, the quality of these methodologies of teaching is expected to be comparable and the achievement of learning outcomes is not to be compromised, whatsoever in any situation. Unfortunately, other teaching and learning activities cannot meet their learning outcomes without an effective physical, and social, interaction between the instructor

and learners and between learners themselves (Mohamed Ibrahim, 2018; Singh, 2018). During the pandemic, lecturers were required to adapt quickly to the rapid transition in the education process and depend completely on the online platforms available to deliver their courses, exams, and other required teaching and learning activities. While the rapid transition to ODL was a mandatory and necessary action to ensure learning continuity during the COVID-19 pandemic, it was not always a smooth process, and posed many challenges for lecturers, learners, and their families (Almetwazi et al., 2020; Ashiq, Bajwa and Ashiq, 2020; Efendie, Abdullah and Yusuf, 2020). The impact on student's mental health, lack of motivation by learners, difficulty in adapting to ODL methods, technical and bandwidth problems, and content creation of ODL materials for didactic and, especially, practical and laboratory-based courses, were among the main challenges encountered (Al-Kumaim et al., 2021; Ferri et al., 2020; Shawaqfeh et al., 2020). The inability to conduct face-to-face practicals require a creative approach to change from physical interaction to virtual communication. Even industrial attachment requirement was conducted virtually. Other challenges include the economic impact on families and the immediate and high demand for training and IT support that included the aspect of speed and quality of internet connection (Browning et al., 2021; Cullinan et al., 2021; Qandil and Abdel-Halim, 2020). The Bachelor of Pharmacy (Hons) (BPharm) program at the Faculty of Pharmacy, Universiti Teknologi MARA, Malaysia is a nationally accredited pharmacy program. The program is steadily evolving to accommodate the demand of local needs and new national and international professional trends. In addition, the program thrives to improve its pedagogical approaches to maintain the quality of the learning process. It is crucial to get feedback from the stakeholders, especially the students, as evaluation of their courses and the teaching process can provide direct and indirect quality indicators and is a channel for constructive feedback for program administrators and the faculty. Analysis of evaluation results is used in the continuous quality improvement (CQI) of the program. Hence, this study aims to obtain the third-year pharmacy students' feedback at the end of a course; Pharmacology of CNS Drugs; to assess their perception of the transition to ODL imposed by the COVID-19 pandemic.

METHODOLOGY

2.1 Rationale

This study emphasizes the investigation of an ODL experience in which course design and delivery that was initially designed for blended learning had to be drastically transformed to an online instructional design strategy. This was planned and implemented to alleviate the negative effects of the COVID-19 pandemic, a big step taken by the management of UiTM. Consequently, the choice to investigate student attitudes and perceptions, although seeming subjective, is key to evaluate the experience under these circumstances, which are shared by many institutions and programs around the world. This study will look at the ODL experience of students and faculty as this mode of delivery is going to become the new norm, at least partially. Google Classroom is used for all teaching sessions where all the instructions and assignments are given including links to the recorded lectures or live lectures. Live lectures are conducted via Webex or Microsoft Team while Padlet and Google Meet were used for interactive and discussion sessions. Other online interactive games and quizzes were also employed to engage the students' understanding of the topics being taught. Instructional materials were delivered, both synchronously and asynchronously.

2.2 Study design

The data for this study were based on students' experiences during the period they were involved in ODL offered by the Faculty of Pharmacy at UiTM. The transition to ODL was in response to a whole country lockdown similar to all countries in the world. During that time, lectures, seminars, and examinations were conducted from distance by online methods and virtual platforms. These educational activities were planned to be carried out similar to the regular semester of 14 weeks with modifications to suit the ODL approach. Any changes were communicated to all students ahead of time, that included but were not limited to scheduling, assessment, grade distribution, as

well as addition or deletion of educational activities. A guideline was given to both parties i.e. lecturers and students. All activities that need physical presence were suspended and each course had an action plan with significant details for all further requirements. Online learning was a mixture of live online sessions, recorded lectures, online live discussions, and presentations. There was one online midterm exam at week 8 using a web-based learning management system (LMS), Canvas, for each course as well as pre-announced course-related assignments, which was documented in the course plan of each course. There was full technical support available for faculty and students throughout the pandemic lockdown period.

The faculty's academic administration closely monitored all educational activities between faculty, students, and resource person i.e. lecturer-in-charge. All changes in each course were documented in compliance with quality assurance standards aligned with the program learning outcomes and course learning outcomes. Students were asked to complete an online questionnaire as an exit survey, in addition to what was required by the UiTM's Academic Affairs Unit under UFUTUTRE (an internal platform for delivering learning content online). Participants were given a link to the questionnaire and a statement informing them that participation is important for the improvement of their ODL experience, but at the same time their identities will stay anonymous to maintain privacy and that their responses will be strictly confidential.

2.3 Sample and setting

The study sample included all third-year pharmacy students from both genders who are currently enrolled in the BPharm program, as of the academic year 2020-2021, at the Faculty of Pharmacy, UiTM, Malaysia. The survey questionnaire was sent to students via a link in the Google Classroom after the conclusion of the semester and given adequate time to respond. A reminder was given a few days before the deadline.

2.4 Questionnaire design

The survey contained simple questions on the preparedness of the course, attitudes towards the course, the online education tools used and barriers to the online learning domain. The survey was designed based on previously validated scales and qualitative information collected at the beginning of the pandemic lockdown (unpublished). The validation and reliability of the final survey were not performed. The final questionnaire consisted of 3 major domains; the students' preparedness domain, attitudes domain to online learning and barriers domain. Likert scale-based questions were used to assess the 2 major domains with a total number of 3 questions to assess the preparedness domain and 2 questions to assess the attitudes domain. Each answer was given a point-based score (strongly disagree=1 point, disagree=2, neutral=3, agree=4, strongly agree=5 points). This leads to perfect scores of 15 for the preparedness, and attitude domains. To assess the barriers domain, 2 open-ended questions were asked so that they can answer based on their complete knowledge, feeling, and understanding. It means that the response to this question is not limited to a set of options. Keywords were identified and grouped by theme to form five categories: interaction (including communication with instructors and other students), convenience (including the suitability of the approaches used), structure (including clarity, instructor's facility with online instruction and structure of assessments), platform (including the online platform for lectures and discussion), and workload (including assignments and assessments). "Other" was included to capture comments not easily grouped under any one of the above. The other 2 questions were asked on the preferences of live or recorded lectures and preferences of interactive platforms.

Preparedness domain questions (total of 3 questions) evaluated if the students were well-prepared to join the course through online learning and their preparedness in terms of their background knowledge and technical skills were collected. Attitude domain questions (a total of 3 questions) were more than preparedness questions to capture either the positive or negative student experience pertaining ODL. The questions include the students' perceptions regarding the quality of the online learning, and their preferred online learning platform.

There was also a question about the content delivery (recorded or live lecture sessions) in this course. Barriers domain questions (a total of 2 questions) addressed the anticipated barriers that might be faced by the students throughout this new emerging experience. These barriers were related to the ODL experiences acquired during the pandemic outbreak. The concern was to motivate students to get into the experience and to adapt to unexpected changes.

2.5 Statistical analysis

Independent samples t-test was used to compare the mean difference between gender. A P-value of less than 0.05 is considered statistically significant.

RESULTS

3.1 Participants' characteristics

The survey was distributed to 186 third-year pharmacy students. A total of 137 responses were received, accounting for a response rate of approximately 73%. Participants' characteristics are presented in Table 1. Female students represented 88.3% which is consistent with their overall percentage in the BPharm third-year student's population in the faculty (87.1%).

Table 1. Characteristics of participation

Gender	N (%) = 137
Male	11.7
Female	88.3

3.2 Preparedness of pharmacy students towards the course

The preparedness score was calculated from the sum of each question's answer score (all 3 questions). Average scores ± standard deviations of students' preparedness level toward online teaching at the pharmacy school are presented in Table 2. The preparedness scores ranged from 8 to 15 with an average score of 13.04 ± 1.59, around 86.7% of a

perfect score of 15. Preparedness scores for both females and males were almost similar where the average females' score was 12.99 ± 1.62 and the average score of 13.44 ± 1.36 for male students, while there was no significant difference in the perceived preparedness level between males and females (P = 0.201).

Table 2. Preparedness, attitudes and barriers faced by pharmacy students toward online learning.

Gender	Preparedness Score*	Attitudes score**
Male	13.44 ± 1.36	8.88 ± 0.96
Female	12.99 ± 1.62	8.40 ± 1.16

*Preparedness Score: Score made up of the average answers for 3 preparedness questions. The answers ranged from 1-5.

Attitude Score: Score made up of the average answers for 2 attitude questions. The answers ranged from 1-5.te * Attitudes score Barriers ***

3.3 Attitudes of pharmacy students toward online learning

Attitude score was calculated from the sum of each question's answer score (2 questions). The average scores ± standard deviations of students' attitudes level toward online teaching at the faculty are presented in Table 2. The attitude scores ranged from 6 to 10 with an average score of 8.46 ± 1.14, about 84.6% of a perfect score of 10. There was no significant difference in the level of the attitude between female and male students, (P = 0.457).

3.4 Barriers experienced by pharmacy students towards online learning

Barriers were assessed based on the keywords identified (2 questions). The students responded to the questions asking what contributed to their satisfaction or dissatisfaction with ODL and were tabulated. Based on the keywords, 'online course structure' ranked highest, followed by 'interaction' and 'online learning platform'. For those who were dissatisfied, the most common reason given was also 'course structure'. The remarks were mostly due to the assignments

given in this course and the fact that other courses were overlapping in deadlines, proving too much to handle for some students. Those who were dissatisfied also listed the inconvenience of the remote learning approach where PBL sessions via the platform used and the online midterm exam conducted had negative feedback.

The online course structure was the greatest factor influencing students' satisfaction, representing 51.8% of the total 137 respondents expressing satisfaction. Concise lecture notes to complement the lectures were part of the reasons for their satisfaction with the online course structure. Also, the students enjoyed the use of various styles of teaching with animations and colourful slides for clarity.

Interaction with the lecturers was ranked second (19.7%), mostly due to the ability of the lecturers to connect with the students i.e. interactive sessions, during the tutorial and PBL discussions that were conducted via Google Meet and Padlet. Short quizzes before and after lectures are also commended as a recap session for them on the particular subject. The positive interaction was primarily established with the instructors using platforms such as Google Forms and Quizizz. Most students preferred Google Forms (27.7%) compared to Quizizz (0.8%), whilst the rest (65%) of the learners enjoyed both platforms. Most of the students welcomed the initiative of using the two platforms for a better understanding of the subject in the form of a quiz.

The convenience of the learning approaches was ranked third, accounting for 18.2%. The lecturers were creative in conveying the information needed for the course in the ODL mode. Most of the students favoured recorded lectures with 58.2%, 5.1% preferred live lecturers and 43.1% do not mind either way. As for the preferences of online platforms, the students were allowed to choose more than one answer. Overall, the students chose Google Classroom representing 92.7%, followed by Google Meet (69.3%), YouTube (68.6%), Webex (60.6%), Padlet (50.4%) and Microsoft Teams (9.5%). The remaining remarks were classified as "Other," representing 3.6%. "Other" included satisfaction with the coordination of the course. Motivation and tips to study for exams posted on the announcements at Google Classroom were also mentioned. The learners felt the motivation

helped them throughout the semester. Only 1 student did not leave any remark.

Conversely, the course structure was also the main factor affecting the students' dissatisfaction, indicating about 46% of the total 137 correspondence. The learners expressed dissatisfaction with the course content and the clarity of the delivery of the lectures. The inconvenience of the ODL approach was ranked second on the dissatisfaction factor, accounting for 12.4%. The dissatisfaction is with regards to the assignments and assessments conducted throughout the semester. Furthermore, they expressed their discontent with the time given to complete their online assessments (midterm exam) which were insufficient. Lack of communication with the instructor and classmates also added to the dissatisfaction. Being remotely isolated from the educational environment caused frustration among the students as they were not able to communicate with other students and have a direct connection with the lecturers. The learners complained about the workload, indicating 5.8% of the total 137 comments. Overlapping assignments given from other courses were said to have increased their workload unnecessarily and should be revised. Dissatisfaction with the platform used accounted for another 1.4%. The remaining remarks were classified as "Other," representing 10.2%, including dissatisfaction with the internet connection at home, the current situation where the students are not able to be physically at the faculty and their exasperations towards their midterm exam marks. Approximately 21.9% of the learners did not state any barriers towards ODL in this subject.

Table 3. Barriers faced by pharmacy students toward online learning.

Factors	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
	Satisfaction				Dissatisfaction			
Interaction	4	28.6	23	18.7	0	0	0	0
Convenience	0	0	25	20.3	1	7.1	16	13.0
Structure	7	50.0	64	52.0	8	57.1	55	44.7
Platform	3	21.4	5	4.1	0	0	2	1.6
Workload	0	0	0	0	0	0	8	6.5
Others	0	0	5	4.1	3	21.5	14	11.4
No comments	0	0	1	0.8	2	14.3	28	22.8

3.5 Areas of development necessary for e-learning

Students identified certain areas of development as necessary needs for ODL. The question associated with this is open-ended. The majority of the students (~85%) felt that the content delivery was adequately given with various platforms used to enhance understanding and engage students' attentiveness. Approximately 19.7% of the students wanted fewer assignments given, as their optimism towards ODL was affected due to the increasing workload. This is despite the fact that the course structure was revised based on the student's learning time requirement instructed by the accreditation body (Malaysia Pharmacy Board and Malaysia Qualification Agency). The students wanted more time for them to answer the exam questions that were conducted online as most of the questions were open-book questions.

3.6 Survey questions analysis

The number of students who answered each of the survey questions was evaluated and the percentage of students who answered questions by "agree or strongly agree" as well as "disagree or strongly disagree" in both domains of preparedness and attitude are shown. The barriers domain were assessed based on open-ended questions. The results indicated that about 94.9% of the students agreed that the Faculty of Pharmacy, UiTM was well-prepared and ready for online learning, necessitated by the complete transition into online education as a result of the COVID-19 pandemic. The results also indicated that more than 86.9% of the students showed positive attitudes toward the provided

ODL during the COVID-19 pandemic. Finally, the results indicated that about 83.9% of the students identify some difficulties with the ODL implementation during the COVID-19 pandemic. However, about 16.1% of the students did not identify any hindrance.

DISCUSSION

Distance learning is an educational process where students receive instruction through online classes, video recordings, video conferencing, or any other audio/visual technology medium. It enables people to receive an education without having to be physically present in a classroom (Cole et al., 2014; Ferri et al., 2020; Mohamed Ibrahim, 2018). ODL was adopted by almost all teaching institutions worldwide, including Malaysia during the COVID-19 pandemic (Al-Kumaim et al., 2021; Allam et al., 2022; Stawicki et al., 2020). There were many challenges faced in implementing remote learning i.e. technological, pedagogical and social challenges (Ferri et al., 2020). The technological challenges are mainly related to the slow and unreliable internet connections and the lack of necessary electronic devices for the students to utilise (Ferri et al., 2020; McKie, 2020). This may cause the students the ability to access higher education from home due to their "digital poverty". The pedagogical challenges are mostly associated with lecturers' and students' incompetency in digital skills, the lack of structured content versus the abundance of online resources, students' lack of interaction and motivation and lecturers' shortage of pedagogical content knowledge needed for online teaching (Browning et al., 2021; Ching et al., 2018; Ferri et al., 2020; Seymour-Walsh et al., 2021). The social challenges are mainly related to the lack of human interaction between lecturers and students as well as among students, inadequate physical spaces at home to receive lessons (lack of access to a quiet space to study) and the lack of support of parents who are frequently working remotely in the same spaces (Ferri et al., 2020; McKie, 2020).

The good preparedness scores were as expected since both students and faculty have very good knowledge and skill to handle a computer and are familiar with many online applications for online education such as Google Classroom®, which has been used as the main learning management system (LMS) at the university. In addition, this is the year where students start

taking and end up finishing the largest number of therapeutic courses which are heaviest on content than other courses in the BPharm study plans. It is interesting that although the course contains two practical sessions, there were no remarks made on the activity. This indicated that the delivery method of the particle sessions was effective. The lecturer used live demonstration sessions in addition to other pre-recorded demonstration videos and PowerPoint® presentations. Even though the majority of the students showed satisfaction in the ODL online learning, they expected face-to-face instruction over that online learning. This is supported by other studies that reported that attending classes in person, allows the academic and social interaction between the students and instructors and among students, and the lack of such interaction undermines student learning and reduce their motivation levels (Almetwazi et al., 2020; Cole et al., 2014; Shawaqfeh et al., 2020). However, most students preferred recorded lecture sessions so that it will be easier for them to rewind and repeat the lectures anytime they want. A study done in Korea showed that pre-recorded video lectures are preferred to live ZOOM lectures due to their flexibility, convenience, and educational effectiveness (Maidul et al., 2020). Video lectures for the initial delivery of knowledge would be very effective and may have importance equal to that of face-to-face lectures (Brockfeld et al., 2018). However, face-to-face lectures may prove to be more effective as they provide more structured learning schedules and help the students to better manage their workload (Mayer, 2001; Ranasinghe & Wright, 2019). Hence the need to implement strategies to ensure the ongoing effectiveness, efficiency and engagement of lectures transitioning from face-to-face to online delivery (Seymour-Walsh et al., 2020). The suggested strategies are innovative cognitive learning theory, promoting learner engagement and minimizing distraction, and application of available online software to support active learning. This will enable lecturers to navigate the challenges of lecturing in an online environment and plan fruitful online lectures during this disruptive time (Seymour-Walsh et al., 2020). This was mentioned by the students when a few lecturers were commended for their use of new technology such as Genially, an online tool to create an interactive and animated presentation. The use of YouTube was also beneficial to the students as this platform transcribe the recorded video to text.

Among the challenges that the participants of the current study agreed on was the increase in academic workload posed by the ODL during the pandemic

This is supported by a study done where the students are experiencing enhanced academic workload, anxiety due to separation from school, and fears of contagion that led to stress (Son et al., 2020; Yang et al., 2021). The participants of this survey felt that overlapping assignments from other courses at a similar deadline drove them to unnecessary stress that may affect their interest in the subjects they enrolled. A heavier workload causes students to adopt surface approaches as a shortcut, and memorizing without thorough understanding (Cheung et al., 2020). It was found that overloaded students experience higher levels of stress and more physical problems like sweating, headaches, exhaustion, stomach problems, and/or sleeping difficulties. Heavy academic workloads can create a feeling of nervousness and anxiety that can cause stress and can affect students' mental health if prolonged (Abracero et al., 2021; Kausar, 2010; Rahim et al., 2016). A study has suggested that tests and assignments should be scheduled at intervals to avoid giving those tests and assignments at the same time as this will become burdensome and stressful to the students (Aam et al., 2017).

Other challenges included mainly technical problems, lack of motivation by some students toward virtual learning, information overload, "mind-wandering" and maintaining long-term focus through the teaching session. This is in an agreement with studies that have evaluated the challenges and barriers faced by students during their ODL process (Shawaqfeh et al., 2020). As mentioned before, the challenges and problems faced during online learning in healthcare professional education can be overcome by following several effective measures such as implementing solid strategies to improve student engagement and reduce distraction, and applying the cognitive theory principles that can help to make the online learning experience more fruitful, subsequently meeting the expected learning outcomes (Shawaqfeh et al., 2020; Stawick et al., 2020). According to Cole et al. (2014), student-instructor interaction and learner-content interaction are very important as onground classroom, a synchronous education platform, allows the student to have questions answered and for the lecturer to elaborate on points to be made at the time the student is having trouble. This onground classroom can have a mix of online and onground sessions. Also, interaction with other students contributes to the sense that there is a community of learning and provides additional support for the student to expand his or her understanding of the material that provides biological as

well as affective significance (Cole et al., 2014; Darling-Hammond et al., 2020). Such relationships help develop the emotional, social, behavioral and cognitive competencies, vital to learning (Darling-Hammond et al., 2020). Thus, motivational inputs from the lecturers are important to boost the morale of the students to perform better despite the current situation as motivational strategies shape students' learning environment (Hornstra et al., 2015). This was remarked by the students on the gesture made by one lecture that always shares motivational quotes and encouragement throughout the semester. Many of such obstacles could be overcome through the adoption of several measurements. This is generally valid for theoretical courses where online learning can be of comparable quality to traditional learning. Depending fully on online methods for practical and experiential learning of health professions students is a very challenging perspective as students are expected to experience and apply what they learn, in real-life patient care situations.

However, it should be recognized that educators are under huge pressure to provide tertiary and ongoing professional development online amidst varying levels of physical isolation requirements and combined with soliciting innovative approaches to gauge students' attention (Seymour-Walsh et al., 2020). The new 'normal' that may emerge from such an environment has the potential to revolutionize education for regional, rural and remote students, clinicians and educators. Moreover, the delivery of ODL need not reduce the quality of educational design and need not be reduced to a uni-directional transference of knowledge by means of didactic monologue. Hence, it is recommended that lecturers should consider: 1) questions and images to stimulate thought and encourage problem-solving; 2) gathering real-time input from students by text-based chat or audio responses; 3) planning small groups discussions to supplement what has already been addressed in the lecture; 4) exercises that enable students to identify their individual and corporate gaps before or after the lecture; 5) providing resources to review previous learning, retrieving existing knowledge and adapting existing schemata to the new content; 6) reducing the volume of new information to align to potential reductions in learners' cognitive reserves (Seymour-Walsh et al., 2020).

The dissemination of the survey was done due to the nature of the pandemic on a core subject in the third-year study of the undergraduates. As a result,

there is a possibility that relevant COVID-19 environmental factors might affect the quality of responses like fear, anxiety, uncertainty or frustration towards the pandemic outcome. The questionnaire was easy to answer, however more questions in each domain might be considered to portray a more comprehensive assessment. This survey could also be extended to other higher learning institutions in Malaysia that offer the same course. Further limitation of the present study is the possibility of students giving desirable responses based on what they perceive to be expected of them.

CONCLUSION

Up to our knowledge, this is the first study that evaluated the perception of pharmacy students toward the faculty's and their own preparedness for distance learning, their attitudes toward the online learning experience during the period of COVID-19 outbreak and rapid adoption of fully online instruction for this subject, Pharmacology of CNS Drugs. Also, the study evaluated and identified the barriers perceived by the students towards ODL. Addressing these issues is expected to help in the continuous quality improvement of online learning as students progress into the coming academic years. This is especially important as ODL platforms might be the only available mode of learning and teaching that can ensure learning continuity during disasters such as the COVID-19 outbreak. This study revealed a positive attitude by pharmacy students in UiTM on online learning. Also, students have positively perceived the institution, instructors, and their preparedness for online learning. Most of the students were satisfied with the online learning experience during the university's lockdown due to COVID-19. This study evaluates real-life students' experience at a pandemic outbreak to identify areas that might need improvement. Effective ODL in the health professions education has become a necessity and continuous development of ODL approaches should be pushed forward to maximise improvements for future development of health professional education and online learning delivery.

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Planetarium Pedagogy and Learning Experience: Exploration into Planetarium Education Program

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Abstract: This paper is an exploration of the education program conducted by National Planetarium Kuala Lumpur (PNKL), educational theories well as the inclination of education program with the Standard Based Curriculum for Secondary School (KSSM) for science subject. The methods used in this study are document analysis and participant observation. This study has found that there are two types of education programs conducted by PNKL which are on-site program and off-site program. The Educational theories applied in the education programs are constructivism and behaviourism. Some educational approaches embedded via the education programs conducted by the PNKL are object-based learning and artful learning. The study also investigated the link between the education program with the Standard Based Curriculum for Secondary School in the science subject. The topics are best taught in the planetarium because of its capacity to speed up learning and help explain unobservable phenomena. The implications of this study and recommendations for future research are discussed based on the findings of the study.

Keywords: Explotary, Planetarium

INTRODUCTION

Planetariums are the world's astronomy classrooms and theatres of public science education that have been serving people for the past century. In a time when quality science education is more important than ever, a scientifically literate public is an essential part of the progress of any country. Planetariums around the world both inspire and educate people of all ages concerning the surrounding of the Earth and as well as the place in the Universe. Due to advancement of technology, humans can now gain knowledge of space in a planetarium. A planetarium allows astronomical concepts to be demonstrated in a three dimensional environment that significantly aids spatial understanding. The planetarium setting is not only educationally effective but also awe-inspiring. As skilled educators, teachers plan for school field trips for students to learn, as a school field trip acts as an educational attraction to students. The best approach to teach astronomy at lower secondary education in Malaysia is through the utilization of outdoor learning environment.

The National Planetarium (PNKL) is an informal science institution which has a significant role in supporting the Ministry of Science, Technology and Innovation (MOSTI) to propagate and spread space science awareness and knowledge and in the development of space science resources for the nation. The mission of this planetarium is to provide infrastructure and quality service to the society pertaining astronomical activity and space science. There are four main functions of PNKL: (1) to cultivate STEM astronomy where the PNKL aims to empower the role of the national planetarium as an organization that cultivates the astronomy field and space science in Malaysia; (2) to raise awareness on the importance of space science where the PBKL is in the pursuit to cultivate and raise public awareness on the importance of the astronomy field and space science via screening, exhibition, program and social media; (3) digital screening, where PNKL provides skills in handling digital screening of optical astronomy and amateur radio; (4) Human capital development, where PNKL serves to provide recommendation, coordination and guidance on astronomy and space science in Malaysia.

A planetarium is a well established informal science education tool. A study was conducted in 2016 aimed to find out the effect of using planetarium as

an outdoor learning environment. This study used the qualitative method to elicit students' opinions towards the area of interest. The results show that the implementation of the planetarium as a source of outdoor learning in science education has a positive impact on students (Seyma and Unsal, 2017). Other research have also found that students learn new knowledge and experience with the aid of a planetarium. Pasachoff and Percy (2005) stated in their book that museums and planetariums can be informal learning environments to students, which are very different from formal education in schools. Students opined that planetariums being part of outdoor activities in science education gives a positive impact, and the results contributed to the literature on school learning environment in Turkey science education in Turkey (Seyma and Unsal, 2017).

A planetarium is generally considered to be a positive learning environment and a great tool to develop public interest - however, there is a lack of research that discuss the alingment of the planetarium educational program with the Standard Based Curriculum for Secondary School for science. Therefore, the research will focus on how education program by Planetarium Negara Kuala Lumpur align with the Standard Based Curriculum for Secondary School for science.

LITERATURE REVIEW

This chapter consists of previous study and findings towards the specified research area and theories in Planetarium education. In this context, the review mainly revolves around the model of learning and the development of astronomy education through application of planetarium in pedagogy.

2.1.1   Contextual Model of Learning (CML)

CML is a framework outlining that learning is complex and involves a chain of contexts which are sociocultural, personal and physical. These three contexts will change with time as learners are molded by experience, what occurs in the world around them and where the learning setting takes place (Falk & Dierking, 1992; 2000). The three contexts will be discussed in detail on how individuals are influenced by each respective

context.

William (2017) suggested that although the venue of planetarium does not fit into the definitions of informal science education, the CML can still be a practical integrative framework to study how planetarium experience lies at the intersection of these three contexts and how the overlap of contexts gives rise to student learning.

Figure 1: CML in Planetarium (modified from Falk & Dierking, 1992)
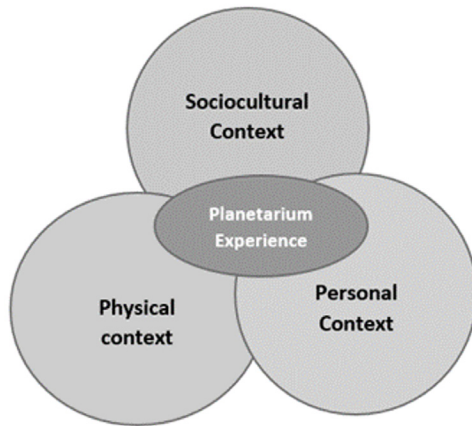
William (2017) suggested that although the venue of planetarium does not fit into the definitions of informal science education, the CML can still be a practical integrative framework to study how planetarium experience lies at the intersection of these three contexts and how the overlap of contexts give rise to students learning.

2.1.2   Sociocultural context

Sociocultural context is based on human beings as part of the world in which social and cultural aspects influence the way people think and how people learn. The incorporation of social and cultural elements are essential in order to explain the diversity of different learning styles among students (William,

2017). Therefore, it is significant for educators in formal and informal education settings to take into account the interaction among students, between students and guides/instructors/teachers. In the context of formal education settings, teachers should be supportive in creating a positive classroom atmosphere as well as promoting engagement and learning among students.

The shifting of learning approach from teacher-centered learning to student-centered learning should be put on emphasis as this allows students to speak their mind and discuss topics among peer groups which can open to powerful learning with the assistance of teachers as facilitators. The same idea applies to informal learning settings as well. Falk and Storlsdieck (2005) pointed out both within-group social mediation, and mediation by others outside the immediate social group, as vital aspects that influence learning. Hence, Informal Science Institution (ISI) for instance, the planetarium should create an environment where individuals are given a chance to have both types of interaction for optimal learning possibilities.

2.1.3   Physical context

Physical context refers to the actual physical environment where learning takes place such as classroom, at the zoo, in a museum or within a planetarium. Past research show how learning is affected by the physical space and the ability of visitors to orient themselves within an ISI (e.g Evans, 1995; Falk & Balling, 1982, Kubota & Olstad, 1991). Besides that, the details within the space and architecture influence the total experience and what is learnt. Research has found that lighting, crowding, color, sound and space have subtle effects on learning (e.g. Coe, 1985; Evans, 1995; Hedge, 1995; Falk & Storksdieck, 2005).

Apart from that, factors like exhibits, labels and educational signage as well as time spent by visitors at exhibits are important influences on learning (Bitgood, Serrel & Thompson, 1994; Bitgood and Patterson, 1995; Falk 1994; Serrel, 1996, 1998). Falk and Storksdieck (2005) posed five important factors within

the physical context which are influential in optimizing what an informal institution offers visitors: "advance organizers, orientation to the physical space, architecture and large-scale environment, design and exposure to exhibits and programs, and subsequent reinforcing events and experiences outside the museum" (p.747).

2.1.4   Personal context

Personal contexts refer to individual characteristics in which a visitor or student brings into the learning environment both in a formal and informal settings. Prior knowledge and personal experiences through informal learning have been broadly studied (e.g Dierking & Pollock, 1998; Falk & Adelman, Falk & James, 2003; Hein, 1998) together with personal interest of visitors (e.g Adelman et al, 2001; Adelman, Falk & James,2000 ; Falk & Adelman,2003), while other research have identified the motivation of visitor to attend a museum or other ISI as influential to learning (e.g Falk, 1983; Falk, Moussouri & Coulson, 1998).

ISIs and other informal settings have no power over the personal context yet can provide learners with control over their choices and activities while visiting. This will contribute to personal interests towards learning thus letting visitors to engage in activities attached to prior knowledge and interests. Learners tend to experience and learn new things on their own accord as students are given free choice and self-control. Falk and Storksdieck (2005) described these important personal context aspects which affect learning: "visitor motivation and expectation, prior knowledge, prior experiences, prior interests and choice and control" (p.747).

2.2   Object-based Learning

Object-based learning is a student centered learning approach. Objects can take various kinds, small or large, but the technique usually involves students engaging with, and inquiring physical objects or working in close surroundings. Objects can be utilized in several

forms. In all scenarios, in making learning real, the tangible design of the object, the connection made with it and the understandings that arrive from it can be significant in making learning real. The items are utilized to stimulate the imagination of the learner and to assist them in applying their comprehension to other situations and issues. Student-centered learning brings student skills and curiosity into the course of learning, making the experience more individualized, and engaging the student in his or her own future. The active learning encourages and provides meaningful interactions within learners and provides a welcoming space in which learners feel supported, accepted, valued and approved. PNKL is full with objects and monuments that can be cosider as part of Object-based learning.

2.3   Artful Learning

Most of the monuments in PNKL consist of artistict element. Brothman (2013) explains the artful learning is the idea that the arts provide a basic learning model. Planetarium Negara Kuala Lumpur in its Space Art Series exhibit that the learning activities designed for each episode mainly consist of drawing and making projects such as diorama. The integration of the arts component into science learning has contributed greatly in aiding learners to better understand the subject matter. This is supported with research by Brothman (2013) who described the connection between the arts and the enhancement of critical thinking skills. Booth and Jenson (2001) believe that a race in the brain increases cognitive capacity.

METHODOLOGY

This study is a type of qualitative research as the study opted to answer research questions which require exploratory methods and seek to unearth the opinion, thoughts and feelings of a research subject. Qualitative study is used to help with the understanding of theories and concepts applied in the subject of interest. In this context, the research objectives are to investigate in depth the education program conducted by PNKL linking to the Curriculum Standard for Secondary School. The objectives require formal, objective and systematic process for obtaining information towards the subject matter.

Qualitative data method include participant observation and document analysis. Both these methods help the researchers in answering the research questions. The utilization of multiple methods is significant in contributing the major strength of case study research.

Table 1. Method of data analysis

Section	Method
RO 1: To investigate the types of education programs carried out by Planetarium Negara Kuala Lumpur.	Participant Observation
RO 2: To analyze how the education programs by Planetarium Negara Kuala Lumpur align with the Standard Based Curriculum for Secondary School for science.	Field notes and Content/Document analysis

3.1.1 Participant Observation

Participant observation is a method of data collection in which the researcher becomes one of the participants in the research or participate indirectly in the event under study (Chua, 2016). Participant observation is helpful in obtaining and understanding the physical, cultural, physical and economic contexts in which the study participants live. Researchers can also discover key elements for an in-depth interpretation of the research problem but that were unknown when the study was planned. Data collected by participant observation acts as a check against the biased reporting of what they think of, and is done by the participants. Participant observation is also helpful to understand the physical, social, cultural and economic environments in which study participants live; the associations with and between persons, contexts, concepts, norms and events; and the actions and activities of individuals-what they do, how often, and with whom. Moreover, the methodology helps researchers to establish a knowledge of the cultural environment that will prove invaluable during the project. It provides the researcher with a nuanced understanding of the meaning that personal experience can offer. There is no replacement for the phenomenon of human interaction-interaction with other individuals, with locations, to observe or participate. Observing and engaging are important to understanding the breadth and complexity of human experience-an overarching research initiative for any project in development. Researchers may also discover factors critical for

a comprehensive understanding of the research problem through participant observation, but which were unknown when the study was planned. This is the great benefit of the methodology because researchers do not always ask the correct questions, but they may get true answers to the research questions being asked. Therefore, what is learned from participant observation will not only aid in understanding data gathered by other techniques, but also to design questions for those techniques that will offer the best understanding of the phenomenon being studied. In this study, the researchers paid visits to the planetarium, both physically, and virtually (via its official website). This is considered as primary data where the researcher jotted down field notes which are referred to as textual notes.

3.1.2 Document analysis

Apart from primary data collection, secondary data is also necessary to provide important information in linking the school curriculum with the education program. The utilization of document analysis benefits to the study as data collection from a document study can give background and additional information about the organization being studied (Pershing, 2002). This method of data collection saves time and expenses as the documents are already in written form. Documents can easily be retrieved by the researchers according to their own time. The drawback of using this method is that the possibility of some of the documents being confidential and not accessible.

Documents related to the National Planetarium Kuala Lumpur (PNKL) and Curriculum Standard for Secondary School (KSSM) were selected to be analyzed. The documents were analyzed thematically pertaining to the themes in the curriculum specification for lower secondary school in science subject linking to education activities in PNKL.

DATA ANALYSIS

This chapter provides findings of the research and data analysis. The findings are in two forms which are primary and secondary data. The researcher's field notes from participant observation are the primary data while documents from Planetarium Negara Kuala Lumpur and Standard Based Curriculum for Secondary School (KSSM) for science subject serve as the secondary data. Documents from PNKL and KSSM were analyzed through content analysis.

4.1   Types of education program carried out by Planetarium Negara Kuala Lumpur

The methods used in this study are document analysis and participant observation. This study has found that there are two types of education programs conducted by PNKL which are on-site program and off-site program. On-site refers to the education program within the PNKL and off-site programs refers to programs done by PNKL, but outside the physical building.

Table 2. Onsite Program

Section	Method
Balai Cerap Guo Shou Jing	The observatory is a source used in ancient times to assess the emperor's date for events. Balai Cerap Guo Shou Jing was founded in Gao Cheng, China, by an astronomer. This observatory is important as a calendar source as well as astronomy field for China civilization.
Sculpture	Sculpture is an effort of the Arabs to provide a profound view of the cosmos. From the past, the society in question expanded the field of astronomy to understand the existence of God. In numbers, the Arabic symbol means seven days a week and has to do with space and time.
Balai Cerap Purba	The presence of observatories in a country is seen as the development of civilization. The value of time is gold in which calendars, date and time are significant matters in a nation.
Jam Matahari/ Sundial	A sundial is an instrument that shows the time of day when the approximate location of the Sun in the sky provides sunlight. It consists of a flat plate (the dial) and a gnomon, in the narrowest sense of the term, which casts a shadow on the dial. The shadow conforms various time-lines, which are indicated on the dial to signify the time of day, when the Sun continues to travel through the sky. The Sundial was used before the GMT was set. Local authorities from the past were in charge of time determination. Sundials can be used to determine the date and month at a particular time. There is also a sundial named Jam Matahari Merdeka which functions according to the latitude and longitude in the planetarium.
Batuan Buruj	The Sculpture of the Constellation was placed to give an aesthetic view and refreshing atmosphere which is suitable for visitors' photography moments. The sculpture also contained information explaining the constellation displayed.
Lobby of the planetarium	This area is upgraded in accordance to the exhibition theme which is 'Unstability in Space'. The finishing of the ceiling and the arch with Light Emitting Diode (LED)was made based on the stipulated theme.

Table 3. Off-Site Program

Program		Explaination
Kejohanan Roket Kebangsaan		Kejohanan Roket Kebangsaan is a yearly program organized by The National Planetarium Kuala Lumpur (PNKL) in collaboration with The Ministry of Energy, Science, Technology, Environment and Climate Change (formerly known as MESTECC), Ministry of Education, Universiti Teknologi MARA and Majlis Amanah Rakyat. This program supports science space education across the secondary school curriculum. Participants involved are students who come from government school and Maktab Rendah Sains MARA selected all over the nation from 13 to 16 year old.
AstroCon National Space Week		Held in conjunction with World Space Week Malaysia in 2018, where PNKL worked closely with the Ministry of Energy, Science, Technology, Environment and Climate Change (formerly known as MESTECC). The details of the activities are as follows:
	ISS Contact: Communication with astronauts	This activity is an opportunity for school children to interact with astronauts at the International Space Station (ISS) using the equipment and facilities of the Microsatellite Station National Planetarium.
	Origami Rocket:Co-Organizer of Utusan Karya Sdn Bhd.	Utusan Karya Sdn Bhd jointly organized the origami rocket event. Besides developing origami rockets, participants were also provided with an overview of the types of rockets and paper.
	Saturn in Heaven	Saturn planet observation took place with the installation of several portable telescopes in the stairwell of the PNKL. The presence of many local astronomical groups were included in this operation. In addition to the planet Saturn, knowledge about constellation, stars and other celestial objects found in the universe were also shown to the public.
	MiSI SpaceUp Unconference	Inclusive forum which was conducted to allow open discussion about the Malaysian space industry among activists, experts, academics, industry and space enthusiasts. The Malaysia Space Initiative is jointly organizing this operation (MISSION).
	National Astronomical Convention (ASTROCon)	This activity was a scholarly debate on the subject of Flat Earth or "Flat Earth" by several panels of local experts. The activity was aimed at attracting as many as possible astronomical activists around the country in general and around the Klang Valley in especially.
	Sun observation	During World Space Week, observation of the Sun using a handheld telescope was open to the public.
	The Little Space	The "Space Unites the World" hands-on activity of Si Cilik Angkasa was available to students from kindergarten to primary school.
	Science Technology Education Festival (SCITECH) 2018	The national event known as the Science Technology Education Festival (SCITECH 2018) was organized by the Science Education Department, Faculty of Education UiTM with the association of the Ministry of Education Malaysia (MOE) and the Ministry of Energy, Science, Technology, Environment & Climate Change (MESTECC). SCITECH 2018's partners include the City of Kuala Lumpur, National Planetarium Kuala Lumpur (PNKL), Institut Fizik Malaysia (IFM) and STEM@UiTM. The Faculty of Education, Universiti Teknologi MARA (UiTM) organized the SCITECH 2018 program to achieve the goal of reinforcing science components for school students across Malaysia. With the patronage of the PNKL, SCITECH 2018 was organized under the World Space Week

4.2 Alignment of Standard Based Curriculum for Secondary School for science theme with the Planetarium educational program.

Oriented on the four subject areas of biology, chemistry, physics and earth science, the content for the Science Curriculum Standard Form 1 to Form 5 is built. All four topics are grouped into five themes that are Scientific Methodology, Maintenance and Continuity of Life, Exploration of Elements in Nature, Energy and Sustainability of Life and Exploration of Earth and Outer Space. Nevertheless, it does not consist of all five themes for each learning year. Every theme is segmented into a few learning areas in the Content Standard and Learning Standard. The learning area is detailed in both themes.

Based on the learning field, the Content Standard can have one or more learning standards that have been conceptualized. In the cognitive and affective fields, the Content Standard is written based on the hierarchy. The general statement consisting

of knowledge components, scientific abilities, is the Content Standard statement. In accordance with the expected learning level, thinking skills, scientific attitudes and noble worth. The Learning Standard is the objective of learning, written in the form of measurable conduct. The learning standard included the scope of learning and scientific skills as well as thinking skills that require the need for pupils to do science to acquire the intended scientific concept. Essentially, the learning standard is planned from simple to complex through the hierarchy, but the Learning Standard sequence could be configured to meet the need for learning. The Content Standard for the affective domain is usually presented at the end of that specific Content Standard's cognitive domain, but not all cognitive domains of the Content Standard will be done with the affective domain. The growth of the pupil is prescribed by a term or phrase with one or more specifications that indicate a standard in the context of a learning outcome. Teaching and learning should be holistically designed and incorporated to assist a few learning standards to be achieved depending on the adequacy and standards of learning. In the content standard, teachers should evaluate both the learning expectations and success criteria prior to preparing the teaching and learning activities. When the content standard for the cognitive domain is executed, the content standard for the affective domain is implicitly inserted. To meet the needs for learning to suit the student's skill and style of learning, activities can be diverse to achieve one content quality. In addition to using technology as a medium to efficiently achieve the content quality, teachers are encouraged to schedule activities that require the pupils to generate and be actively engaged in analytical, objective, innovative and creative thinking.

Table 4. Theme Organization of Science Curriculum Standard

Program	Explaination
Themes in Science Lower Secondary School	In the national standard-based curriculum, earth and space exploration and the scientific method are part of the themes. It is intended that learners understand about Earth's motion patterns, phenomena such as stars that can be seen in the night sky.
Science Form 1 Theme 5: Exploration of Earth and Space	The purpose of this theme is to provide an idea of the Earth's structure and how geohazards occur. With the advancement of science and technology, the effects of geohazards can be minimized on humans and the environment. This theme also offers a deeper understanding of fossil fuel formation, renewable energy options and their uses.
Science Form 2 Theme 4: Earth and Space Exploration	This theme is designed to provide insights into the universe, the stars and the solar system. Focus is placed to the nature of different galaxy forms and how the stars are categorized. In the Solar System, the planets are examined to build knowledge that existence and continuity of life can only be sustained by planet Earth. Other phenomena in the Solar System and how they affect life on Earth are also given the main emphasis. Hypothetical problems or anomalies are implemented to promote the analytical and imaginative thinking of pupils.
Science Form 3 Theme 5: Earth and Space Exploration	This theme provides an insight into the impact of the activities of the Sun on the weather in outer space, which also significantly influence life on Earth. This theme also explores technological growth in the exploration and astronomy of outer space.

Findings are in two forms which are primary and secondary data. The researcher's field notes from participant observation are the primary data while documents from Planetarium Negara Kuala Lumpur and Standard Based Curriculum for Secondary School (KSSM) for science subject serve as secondary data. Documents from PNKL and KSSM were analyzed through content analysis

Research Objective	Findings	Summary
RO 1: To investigate the type of education program conducted by Planetarium Negara Kuala Lumpur and target audiences.	Type of education program On-site program Off-site program	There are two types of education programs conducted by Planetarium Negara Kuala Lumpur which are on-site program and off-site program. The target audiences are broad ranging from children to adult.
RO 2: To analyze how education programs by Planetarium Negara Kuala Lumpur align with the Standard Based Curriculum for Secondary School for science.	Themes in science curriculum syllabus Theme 5 Form 1: Exploration of Earth and Space Theme 4 Form 2: Earth and Space Exploration Theme 5 Form 3: Earth and Space Exploration	The themes in Standard Based Curriculum which can be linked to education program and content knowledge in themed exhibition are Exploration of Earth and Space in science subject for lower secondary students.

CONCLUSION

The first research question investigated the type of education program carried out by PNKL and their target audiences. Education program is referred to as an education curriculum developed by an institution or education ministry that considers the subject's learning progress in formal education. The curriculum may be institution-led programs that increase awareness and interest in specific subjects. In this context, PNKL is an informal science institution that serves and provides education programs that dictate the learning progress of science subjects in formal education. Based on the findings previously mentioned, there are three types of education program conducted by PNKL; on-site program, off-site program and online program. On-site programs are programs that take place at the national planetarium. PNKL has held numerous exhibitions and a number of programs that take place on-site. With good facilities that could accommodate huge numbers of visitors at a time, the national planetarium is a perfect fit when it comes to learning settings in education.

Off-site programs are programs that take place outside of the planetarium. Programs such as Kejohanan Roket Kebangsaan which was conducted at Universiti Teknologi MARA shows that informal science institutions like The Planetarium Negara Kuala Lumpur has been working together with The Ministry of Education and The Ministry of Science and Technology, Climate and Change (MESTECC) to inculcate Science, Technology, Engineering and Mathematics (or known as STEM) education throughout the nation. PNKL does not only serve as a main tourist attraction with a huge target audience and visitors - the institution also has the advantage of various stake holders to work with. Planetariums are not just for learners who are young but the target audiences is wide-ranging. In order to attend public events, they invite everyone from the country. The planetarium is visited by several community groups and specialist organizations for lifelong learning opportunities. The world today is plagued by many STEM-related matters. In order to make good decisions and foster strong, global effects, it is the public who have the capacity to understand these issues. In these matters, planetariums educate the public.

5.1   The inclination of themes in the Standard Based Curriculum for Secondary School for science subject towards education programs conducted by PNKL

In the national standard-based curriculum, earth and space exploration and the scientific method are part of the themes, it is anticipated that students are taught about Earth's motion patterns, and phenomena such as stars that can be seen in the night sky. The inclination of themes in the Standard Based Curriculum for science subject for Lower Secondary School is through the content of exhibition in the planetarium. The zones mentioned in the findings are Zone A which comprise exhibition on Universe content and Zone B with Space Exploration content. These two zones show subject matter that can be linked to the school curriculum. The Planetarium exhibition as part of the on-site programs conducted by PNKL which applies a variety of methods in presenting the information of space science, can provide learners with a different learning experience outside from the classroom.

With facilities and fun activities, learners not only gain knowledge but they can also appreciate and incorporate values such as patriotism and the advancement of science and technology. Offsite programs such as Kejohanan Roket Kebangsaan is a competition where participants ranging from 13 year old to 16 year old are expected to design a water rocket to be launched in the air. Through this program, participants may, while designing the water rocket, incorporate 21st century skills such as creative thinking skill, critical thinking skills and collaborative skills as suggested in the Standard Based Curriculum for Secondary School (KSSM). These are the attributes stated in KSSM and the education program organized by PNKL has met the criteria to incorporate the scientific attitude and noble values in the learning activities. Apart from that, Space Art Series is an example of an online program conducted by PNKL. Each episode contains a 10 to 12 minute video which highlights different topics such as Knowing Space, Moon, Moon Phases, Solar System, Man on Moon, Galaxy, Spacecraft, Constellation and Alien Planet. This

series is very useful as learning materials for students from lower secondary school to learn about space science under the theme of Earth and Space Exploration in the science subject within the context of learning standards. Additionally, the series has suggested learning activities suitable for each topic discussed in each episode. Teachers, parents, instructors and others can make use of this video as a learning activity while teaching space science to the learners. The activity is fun and can help students to learn more about astronomy.

CONCLUSION

In conclusion, planetarium pedagogy from an instructional perspective is beyond mere surface visits and the use of external sources. Learning space science will be more efficient, fun and meaningful through visits to informal science institutions or science centers. Learning should be optimized and be made truly enriching by visits made through careful planning where visitors have to perform activities during the visit. In this context, instructors play an important role where discussion should be conducted after the visit to deduce the activities performed so that the anticipated learning outcomes or the success criteria could be achieved by the learners. Instructors should make use of planetarium pedagogy as part of learning theories, approaches and strategies as this informal science institution can serve and provide the best services and practices to meet the needs in learning space science. In this study, it has been discovered that the inclination of themes in science subject for lower secondary school which is Earth and Space Exploration could be a huge help in assisting students to understand better, thus drawing students' interest and attention to learn science, with the hopes that it will eventually lead to the students developing a deep interest towards STEM-related careers in future. Planetarium pedagogy is comprehensive and the target audiences for the education program is not just for young learners but also the general public to best experience and appreciate space science and astronomy that has contributed so much to the development of the nation.

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Open and Distance Learning for Limited Internet Access in Technology and Engineering Course

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Abstract: The 2019 Coronavirus outbreak, or Covid-19 pandemic, has accelerated the deployment of internet technology across various sectors, including education. During the early stages of the Covid-19 pandemic, internet platforms and access services were unsatisfactory, particularly in some areas of Malaysia. However, the internet's platform providers are constantly improving their systems. Today (after two years of the outbreak), there are many reliable instruments available for teaching and learning (T&L). Among the initiatives taken by the Internet service providers (ISPs) are continuous expansion of their coverage area. However, this expansion takes time and huge amount of costs are involved. As a result, we took the idea of manipulating multi-featured Telegram as an alternative for students who do not have good access to the internet. We discuss the features available on Telegram in this article. We adapted the discussion on the application based on the mode of delivery, such as computation, description, activities, and others. Additionally, a survey was undertaken to elicit feedback on Open and Distance Learning (ODL)'s usage of Telegram in the T&L process. It has been demonstrated that the use of Telegram enables them to easily and rapidly acquire educational resources.
Keywords: Engineering education, IM Application, Instant Messenger, Telegram Channel, Telegram Messenger

INTRODUCTION

At the beginning of 2019, the coronavirus outbreak or covid-19 pandemic, caused most countries to take drastic measures, such as curfews, to prevent the development of more significant outbreaks. As a result, different sectors, including education, made the move to conduct their businesses and operations online. However, the situation is less favourable in Malaysia, where not all segments of society can afford or are able to use the internet due to a lack of coverage. Numerous strategies are utilised to ensure that no group is left behind, particularly in the education sector. The instant messenger (IM) applications are the best medium to cater to this drawback such as Whatsapp, Telegram, and others.

In one of the related studies, the author investigated the quality of ODL experience for students who enrolled in the Computer Organization and Programming Paradigm course (Abd Aziz et al., 2021). They evaluated three significant factors: the learning materials utilised in ODL, the platforms employed, and the delivery techniques used in ODL. Microsoft PowerPoint notes, lecture videos generated by lecturers, online worksheets for tutorial sessions, and discussion boards to facilitate interaction between students and lecturers are used as instructional resources in these courses. Google Classroom, Google Meet, UiTM Learning Management System (LMS), uFuture and UiTM MOOC, Whatsapp, Telegram, Youtube, and a few web-based programming software were used in this study to implement ODL. According to the findings of this study, 84.08%, 84.46%, and 83.71% of responses are favourable toward the learning materials, platforms, and delivery mechanism employed in ODL, respectively.

Though there are many online and social media tools available- Telegram in particular, has become the focus of some researches including (Aladsani, 2021). The authors focused on enhancement of online educational interaction for ensuring engagement in online learning due to lack of physical communication. By employing a qualitative approach, 77 university students were selected as respondents. The respondents pointed out some instructional activities that could improve learner and instructor interactions, as well as interactions with fellow learners. The respondents' perceptions and feelings towards Telegram were also obtained and analyzed. Some of the identified attractive features of Telegram are: easy to download, ability

to store messages in resource repositories, synchronous communication with instructor, notifications and alert messages, allowing users to edit and improve answers, and security provisioning by hiding mobile phone numbers. Telegram was also perceived as easy to facilitate technically and its cloud-based structure contributes to faster process of uploading and downloading files.

Some of the above-mentioned Telegram features were also acknowledged by (Ardimansyah & Widianto, 2021) especially the ability to withstand limited internet quota, space and time. Instead of conducting surveys to study the effectiveness of Telegram as an online learning tool, (Ardimansyah & Widianto, 2021) proposed and developed Telegram Chatbot to enable a learning process without accompaniment of educator or instructor. Chatbot utilizes artificial intelligence technology where a designed program can interact with humans. The development method was based on the Prototype Method which comprised three phases: (1) system requirements analysis, (2) system design and development, and (3) evaluation. Without the need for attachment to educators, students that have problems focusing during online learning can revisit the learning materials in synchronous mode.

Meanwhile (Owusu-Mensah et al., 2020) conducted a study which involved 100 Post Graduate Diploma in Education (PGDE) Distance Learning Students of the Winneba Study Centre as participants. The study aimed to investigate participants' views on Telegram's capability in learning modules delivery and convenience in using the application. With respect to delivery and convenience criteria, the findings verified that Telegram is indeed a very efficient application and suitable for busy scheduled remote students. The reviewed works highlight about Telegram effectiveness in terms of teaching methods and activities as well as addressing engagement between learner and instructor, while this paper emphasizes Telegram's capability in handling limited internet access.

This paper discussed ODL implementation using Telegram Channel for easy access and those with limited internet connectivity. The advantages of using Telegram compared to Whatsapp, including Telegram Desktop, is that it does not need to synchronize with the connection in a smartphone. It means that Telegram Desktop can still be accessed, even when a smartphone is out of battery. Besides that, Telegram offers more capacity or size of a file, video,

and audio to be shared directly. A new member can view the previous post before joining the channel. In a Telegram channel, members cannot post anything unless they can reply to the admin post. This is suitable to build a full content of the course which is similar to a Massive Open Online Course (MOOC) but there is a limitation of Learning Management System (LMS). For two-way communication, it is recommended to use Telegram Group Messenger. Telegram also supports more features such as gif animation, poll/quiz, message scheduling, editing and others. The usage of Telegram is simple, faster and user friendly, especially for those who do not have a PC or laptop- it also provides low data usage.

The research was conducted during the semester session of March-July 2020 in the Computer Organisation course for Computer Science students. This method was also implemented in a Computer Programming course for Electrical Engineering students during the semester session of September 2020-February 2021. Both courses consist of theoretical, computations, and programming. Telegram is used only for the delivery of the contents for these courses. It does not support the programming and simulation platform. However, this paper recommends the Telegram Channel as an ODL platform for delivering the course contents for those with limited internet connectivity, or it is beneficial as a second alternative. Due to its advantages, it is also suggested to be implemented in schools for the online home-based learning. The homework submission looks more organized.

For the first time of ODL implementation during the semester session of March-July 2020, due to the Covid-19 pandemic, the survey to students who took the Computer Organisation course had been carried out in the beginning of the semester. The result reveals that the coverage and the internet price were the biggest challenges for ODL implementation. A total of 18 students out of 61 registered in this course, which is 29.5%, stated problems of internet access. Referring to the data released by the Center for Innovative Delivery and Learning Development (CIDL), Academic Affairs Division, Universiti Teknologi MARA Malaysia, a total of 27.02% students subscribe to unlimited internet data plan while the majority of the students (28.11%) subscribes to less than 5GB internet plan (Center for Innovative Delivery and Learning Development (CIDL), Academic Affairs Division, 2020). This shows that a large number of students are unable to use the internet more efficiently.

In this paper, the development of ODL content is discussed in section 2.1. The survey for students who took the course after the implementation of ODL is elaborated in section 2.2 and its result is discussed in section 3. In the section 2.3, the network monitor software is used to measure data of Telegram usage for specific tasks.

RESEARCH METHODOLOGY

This section presents how the function of the Telegram Channel is manipulated to deliver lessons through ODL. The Telegram Channel can be built during the T&L process or constructed early before starting T&L and built according to the MOOC procedure. The Telegram channel can be reused for multiple semesters; group members can be removed and replaced. In this paper as well, a survey on students' perceptions of Telegram Messenger's usage as the ODL platform was conducted. A total of 55 respondents have answered this survey question.

2.1   The Development of ODL Content

The content of ODL using the Telegram Channel can be divided into 11 approaches. The methodologies consist of video lectures, notes, calculations, voices, images, graphical explanations, gif animation, survey, simple quiz, attendance and submission elaborated in the following subsections.

2.1.1   Lectures video

The short video can be uploaded directly to the Telegram Channel, as shown in Figure 1(a). If the file size is bigger, the file needs to be downloaded by the viewer, as depicted in Figure 1(b). Besides, the video can also be shared using the link as Figure 1(c).

2.1.2   Notes

The compression files for lecture notes are usually using pdf

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format. The notes can also be uploaded directly to the Telegram Channel or by sharing its link.

2.1.3 Calculations

Even though lecture videos can cover the calculation part, calculation steps can easily be understood by sharing the handwritten images. Figures 2(a) and 2(b) demonstrate two different examples of handwritten images for calculation and storytelling.

2.1.4 Audio

The explanation can be delivered using voice recording along with the note's image, as illustrated in Figure 3(a).

2.1.5 Image and Text

The simplest way to deliver the content of syllabus is by providing the image with text. A description of a particular topic can be done through text accompanied by relevant images. Figure 3(b) presents an example of delivery of the subtopic using image and text.

2.1.6 Graphical Illustration

Some subtopics/topics require a graphical explanation. Figure 3(c) exhibits an example of a graphical explanation with text.

2.1.7 Simple survey

Features such as polls are provided in the Telegram, and this feature can be applied as a simple survey. Figure 3(d) indicates an example survey had been conducted. The purpose of the survey is to get the number of students who had made the laboratory report submissions.

(a) (b) (c)
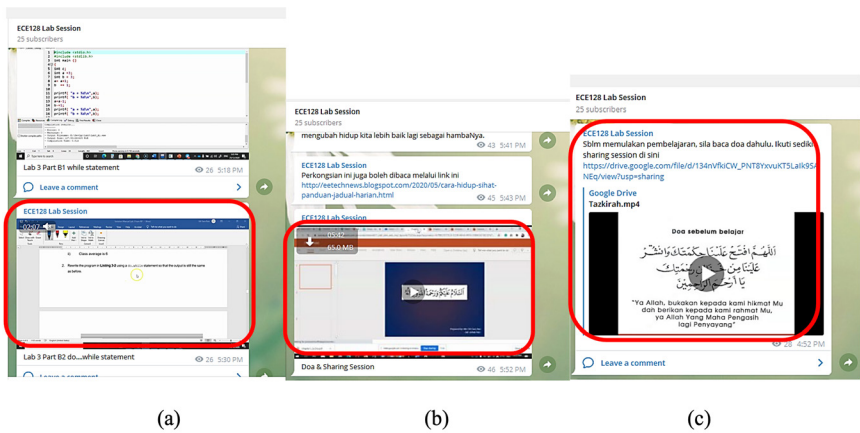
Fig. 1 Methods for uploading videos in Telegram Channel

(a) (b)
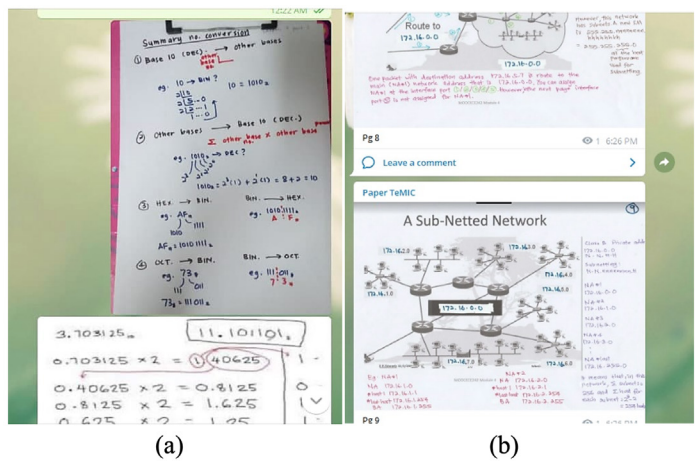
Fig. 2 Handwritten notes for (a) calculation steps and (b) storytelling.
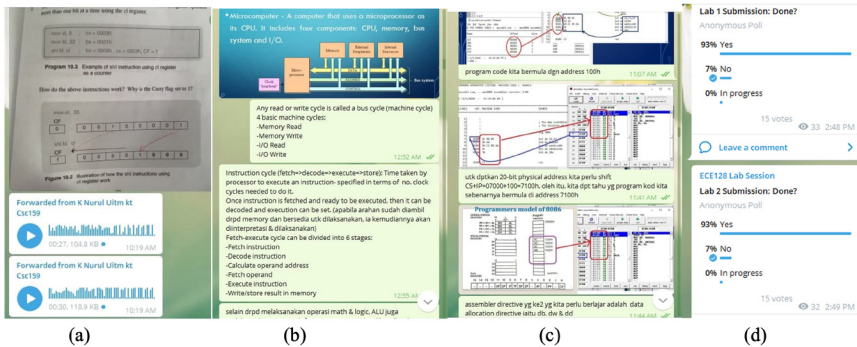
Fig. 3 Content delivery using Telegram Channel: (a)Audio+Image, (b) Image+Text (c)Graphical Illustration, and (d) Survey

2.1.8 Multiple Choice Quiz

Using the same features as the survey in section 2.1.7; polls in Telegram can also be used for multiple-choice quizzes. Once it has been answered, the result appears, as shown in Figure 4(a). Multiple choice quiz with a large number of questions can also be built on Telegram using QuizBot. QuizBot provides questions that need to be answered within a certain period set by the creator. QuizBot can be shared in the way shown in Figures 4(b) and 4(c). This quiz is utilized as exercise, not the assessment.
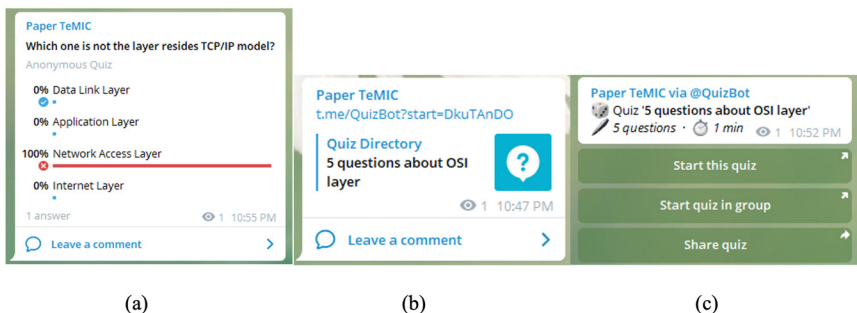
Fig. 4 Multiple choice quiz methods in Telegram can be done through (a) polls, (b) QuizBot with sharing its link and (c) QuizBot embed in a Telegram Channel.

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2.1.9   Gif animation

Gif animation is an alternative approach to deliver course content like storytelling. Gif animation can be built using free online software such as makeagif.com, gif-animator.com, Wondershare Filmora and others.

2.1.10 Attendance

Attendance can be taken through poll or Attendance Group Bot. Each student is advised to use his/her real name or full name in the Telegram. The attendance will be uploaded to Ms Excel sheet using Attendance Group Bot.

2.1.11 Submissions

The submissions can be done through Google Form, and it is organized in a specific folder in a Google Drive. However, for those who have internet access problems, the submissions can be done by replying to the specific chat made by the lecturer.

2.2   Survey

The survey assesses students' perceptions of Telegram's usage as the ODL platform, especially for students with limited internet access. Email ID of respondents is required to identify duplicate respondents. The background of respondents such as respondents' familiarity with Telegram and the usage of Telegram in a particular course code are taken into considerations in the survey. The survey also takes into account internet problems if any. The perceptions of the use of Telegram as an ODL platform are shown in Figure 5.

Telegram as ODL Platform *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Telegram is a user-friendly ODL platform	○	○	○	○	○
The data usage in Telegram is much lower compared to other ODL platform	○	○	○	○	○
It is convenient to use Telegram as ODL platform	○	○	○	○	○
The delivery of course's content by Telegram is effective	○	○	○	○	○
Your understanding of the course has increased after your lecturer shared his/her lecture materials through Telegram	○	○	○	○	○

Fig. 5 Some of the questions in the survey that was conducted.

2.3   Simple Network Tester

Network Usage Monitor is used to collect data regarding the use of Telegram Desktop on any PC running Windows 10. The evaluation takes into account background software such as Kaspersky Internet Protection, OneDrive, and others. As a result, this data represents the entire amount of data used by Telegram Desktop and any background applications running. This testing is used to compare the usage of three different approaches in delivering video via Telegram

RESULTS AND DISCUSSIONS

3.1   Students' Responses Result

98.2% of students are familiar with the Telegram application, and they all use it as an ODL platform for a variety of courses, including mathematics, Islamic studies, and the third language. As many as 44% of students, or 24 students, experience difficulties with their internet connection. 14, 24, 12 and 15 students, respectively, stated that their internet connectivity issues were restricted coverage, slow speed, limited data, and pricey data.

Figure 6 shows the response for student perspective of ODL implementation via Telegram. Overall, most students responded positively, indicating that Telegram aided them in the T&L by ODL. They agree, as illustrated in Figure 6, that Telegram is a convenient tool and a user-friendly ODL platform. They also agree that Telegram consumes far less data than other ODL platforms, that the course content is delivered adequately, and that their understanding of the course has improved as a result of utilising Telegram.

Telegram as ODL Platform

A   Telegram is a user-friendly ODL platform
B   The data usage in Telegram is much lower compared to other ODL platform
C   It is convenient to use Telegram as ODL platform
D   The delivery of course's content by Telegram is effective
E   Your understanding of the course has increased after your lecturer share his/her lecture materials through Telegram

Fig. 6 Result of the students' perspective on Telegram usage in ODL implementation

3.2   Network Testing Result

The Network Usage Monitor is a software to measure total data usage, including background software running in Windows 10. The internet is accessed using a LAN cable Cat7 with connection by ISP's package: Unifi 100Mbps package with the router provided by ISP. Figure 7 shows one of the measurement results.
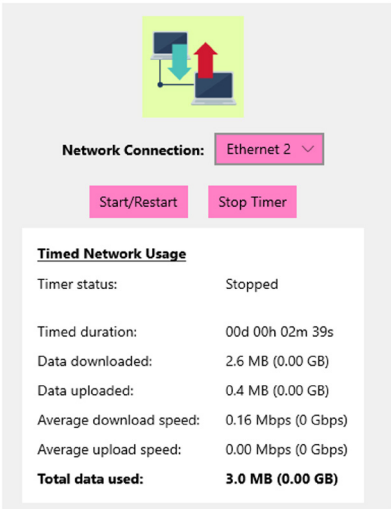
Fig. 7 Data measurement by Network Usage Monitor software

In Table 1, the software measured the total data usage with three different techniques in delivering the video using Telegram with the same duration; 2 minutes 39 seconds. The methods include, first, ensuring that the video is in the Telegram or the link is shared in the Telegram. Then, the video has to be opened outside of Telegram (Google Drive) using 360 pixels and 720 pixels. From the table, we can conclude that the video uploaded directly to Telegram uses the least data.

Table 1. Data usage measurement with three different approaches in delivering the video using Telegram

	Techniques	Duration	Total data usage (MB)
1.	Direct upload in Telegram	2 minutes 39 second	0.2
2.	GD Link with 360 pixels	2 minutes 39 second	3
3.	GD Link with 720 pixels	2 minutes 39 second	3.6

CONCLUSION

The Covid-19 pandemic has affected the educational delivery system. Although numerous ways and platforms have been adopted to support online learning, it cannot be maximised for use if students face internet access issues such as limited coverage, slow connection speeds, limited data, or inability to purchase data.

Instant messengers such as Whatsapp, Telegram, and others make communication more accessible. However, because Telegram's functionalities outweigh that of Whatsapp's, Telegram was chosen as the ODL platform in this study. Numerous strategies are utilised in the T&L process depending on the features accessible on Telegram, which contributes to the platform's attractiveness and minimal data usage.

The results acquired utilising the Network Usage Monitor software indicated that videos published directly to Telegram had the lowest data usage readings compared to those uploaded to Google Drive. The outcomes of the survey among students also showed positive feedback on the use of Telegram as an ODL platform

For future study, we intend to do more precise data measurements utilising GlassWire, which allows separation of the background and application software. Additionally, we intend to incorporate other data usage series depending on various T&L process activities.

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Mattering & Marginality: A Study Among Non-Traditional Learners at A Higher Learning Institution

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Abstract:
The theory of Mattering and Marginality was first formulated in 1981 by Morris Rosenberg and Claire McCullough. It is a form of acceptance of an individual by other people. Mattering is divided into two and they are Interpersonal Mattering and Societal Mattering. Interpersonal Mattering is where a person feels that he or she matters to their siblings, spouse or parents and Societal Mattering refers to a community, learning institution, workplace and others. In this pilot study the Societal Mattering is the focus. This is because the study was carried out at a higher leaning institution. The two objectives of this study looked into Mattering and Marginality among non-traditional learners with regards to their perception towards their peers and faculty at their univeristy. A number of 30 non-traditional learners from a public university took part in this online survey. Mattering Scales for Adult Students in Postsecondary Education was adapted and used to measure the variables; peers and faculty. Interesting implications in the field of Education was found in this study specifically under the concept of Mattering.
Keywords: Mattering, Marginality, Non-traditional learners

INTRODUCTION

The theory of Mattering was coined by Rosenberg and McCullough in 1981 who defined mattering as a form of acceptance of an individual by other people. There are two types of mattering and they are interpersonal mattering and societal mattering (Rosenberg and McCullough, 1981 as cited in France, 2011). Interpersonal mattering is where an individual matters to specific individuals like their siblings, parents and spouses. On the other hand, societal mattering would refer to mattering to a bigger societal entity or community such as learning institution, workplace, team or club.

Mattering is seen to have significance in learning institutions from primary to higher learning institutions. Elliott et al. (2004) stated that mattering is important to humans because it dictates human behaviour. France (2011) further added that if university students feel that they matter to their university, they will be motivated to behave in a certain way. However, when one does not feel so, he or she will feel marginalized and will behave differently. Hence, the purpose of this paper is to share the results discovered on Mattering among online non-traditional learners at a local public university.

STATEMENT OF PROBLEM

Understanding students' feeling of mattering is important at learning institutions. This is because some of the outcomes of the studies could help institutions to look into factors that lead to learners' academic success and better learning engagement in the learners (Hayter, 2015), reduce the number of attrition (Mullen, 2016), and to understand the underlying reasons on why the online traditional learners stay to finish their course of study (Tovar, 2013). Marginalization on the other hand, is the feeling that one does not matter and is insignificant to others (Rosenberg & McCullough, 1981 as cited in Schlossberg, 1989). Phillips (2001) pointed out that support network plays a crucial role in helping non-traditional learners to not feel marginalized at higher learning institutions. She further added that some examples of suport network would refer to professors, lecturers, and advisors. Hence, when one does not feel that he or she matters to his or her learning institution, it could lead to the feeling of marginalization, which then could lead to unfavourable outcomes.

OBJECTIVES

Based on the statement of problem, the purpose of this paper is to shed light on a pilot study conducted on non-traditional learners' sense of Mattering at a public university as well as to look into the sense of Marginalization among these students with a specific focus on peers and the learner's faculty. The objectives of the study are as below.

1. To investigate non-traditional learners' feeling of mattering towards their peers
2. To investigate non-traditional learners' feeling of mattering towards their faculty

LITERATURE REVIEW

Defining the Dimensions of Mattering

The term Mattering was coined by Rosenberg and McCullough, consisted of 4 dimensions - awareness, importance, ego-existension and reliance. Awareness is the feeling where an individual requires the attention of another person. Importance on the other hand is described as other people's concern towards us : they care about our thoughts, doing and our future. In other words, we are seen as important in other people's eyes. Ego-extension is when other people share the same emotions as us. For instance if we feel proud and happy on our accomplishements, other people will also feel the same too. Lastly, reliance is where we see other people depending on us. It is where we matter to other people because they need us [Rosenberg and McCullough, 1981].

Mattering and Its Importance to Non-traditional Learners

According to Pozdnyakov (2017), distance learning is defined as a form of education for adult learners who have priorities other than learning. Pappas (2020) further defined adult learners as learners who have to juggle between work, family responsibilities as well as set their own personal quality time. Hence, it can be inferred that these learners

have a different learning schedules and learning platforms compared to their full-time counterparts. Since adult learners have to manage and organise a complex schedule and responsibilities, it is essential that their higher learning institutions offer sufficient assistance so that they feel that they matter to their learning institutions as it brings out a number of positive outcomes.

On the other hand, a number of setbacks could be seen among adult learners if they do not feel that they matter to their learning institutions. Brito and Rush (2013) highlighted that if adult learners do not feel that they matter to their learning institutions, there is a possibility that the number of attrition could rise. Other than that, adult learners need to feel that the sense of inclusion in their academic setting in order for them to be motivated to complete their courses.

Experience of Mattering with regards to Peers

A number of related studies have looked into mattering with regards to peers. Schlossberg (1989) pointed that integrating mattering into students learning experience could foster a positive learning community for the students which then can improve students' personal growth and development.

Based on a study conducted by Klug (2008) on the phenomenon of mattering that accurately reflect students perceptions of mattering and also to better understand on students' actions, behaviours and practices at their higher learning institution, it was discovered that students felt that they matter when they are recognized by their peers. Other than that, students felt that they matter especially when they are seen as the go-to person when in need and when they are able to help their friends. This made them feel appreciated. In another study carried out by Hayter (2015), it was discovered that when students feels that they matter to their peers, it helped them to succeed in their course of study. Besides that, it also created lifelong friendships and community of learning. The feeling of mattering towards peers has also enhanced collaborative learning environment. Another study conducted by Spaid- Ross (2015) highlighted that when students have a positive experience with their peers, it encourages them to have a

better relationship with others.

On the other hand, a number of studies have also mentioned on the feeling of marginality in higher learning institutions. It was noted in a study by Spaid –Ross (2015) that, although students do mention that they matter to their peers some didn't feel likewise. It was highlighted that age factor was one of the reasons on why some students were not invited to work together in projects.

Experience of Mattering with regards to Faculty

A number of studies have looked into the aspect of mattering with regards to the faculty. In a study carried out by Klug (2008), based on the interviews conducted, it was found that students felt that they matter to their faculty when their instructors/ lecturers invited them to particpate in academic conferences as well as to work on research projects. The respondents felt that they matter as they feel that they are part of an entity and that receiving feedback from their instructors/ lecturers showed a sign that they matter. In another study conducted by Hayter (2015), it was found that the respondents agreed that relationship between students and lecturers is important and extremely valuable for them. Furthermore, they felt that real learning takes place when one gains enough trust and respect from the main classroom figure. Besides that, some respondents mentioned that the bond that they developed with their lecturers strengthens over time.

Marginalization Among Non-traditional Learners

Marginalization has been linked to the success and failure of an individual's educational experience (Schlossberg, 1989). As described in the earlier sections, mattering deals with individual's perceptions that they are important, significant and are of concern to others. Marginalization on the contary is the feeling that one does not matter and is insignificant to others (Rosenberg & McCullough, 1989).

Non traditional learners or adult learners can be characterized as those who are independent and engage in self –directed learning, have some life experiences like work-related knowledge, family responsibilities

and previous education. Hence, based on the characteristics and barriers that are mentioned with regards to adult learners, it is the responsibility of the staff at higher learning institutions regardless of whether they are academic or non-academic staff, to take into consideration on the aspects that make these learners feel marginalized.

According to Phillips (2001), a support network plays a crucial role in helping non-traditional learners to not feel marginalized at higher learning institutions. She further added that some examples of suport network would refer to professors, lecturers, co-workers and advisors. On the other hand, the teaching and learning require learners to have a sense of familiarity in order for them to retrieve assignments, read materials prepared by their course lecturers and communicate with their lecturers (Phillips, 2001).

Underpinning Framework of the Study by Rosenberg and McCullough 1981
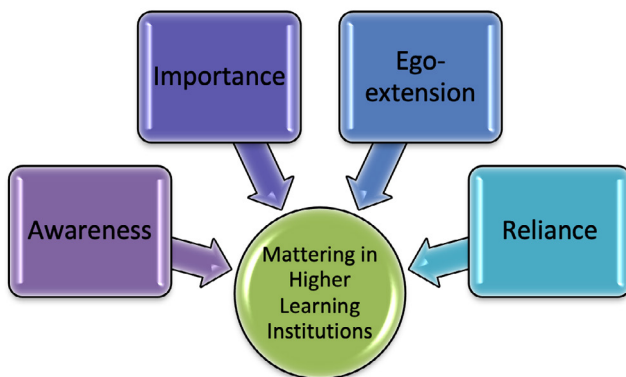
METHODOLOGY

This study used the quantitative method for data collection. Creswell (2009) highlighted that quantitative survey design is useful when a researcher wants to learn more about a population. Creswell (2009) stated that using quantitative survey design allows for a numeric explanation of trends, opinions and attitudes.

A number of 30 online adult learners took part in this pilot study. The 30 respondents came from a public university. The simple random sampling was applied in this study. Data were collected by using online survey. The survey instrument was adapted from The Mattering Scales for Adult Students in Higher Education by Nancy Schlossberg, Ann D. Lasalle and Rennie R. Golec. The survey consisted of three different sections. Section A focused on the respondents Demographic Profile and contained three items. Section B of the survey looked into Mattering under the aspect of the Peers and Section C on Faculty. Each aspect consisted nine and eight items respectively.

Under Section A, respondents were required to tick in the appropriate boxes based on their personal details. The items asked were on gender, faculty and the semester that they were currently enrolled in. Section B and C of the survey required the respondents to choose an appropriate answer based on the items given that best reflect their feelings at the university. The respondents provided their responses in Sections B and C using the following Likert-type scale; Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5). The 8 items under Section B looked into the respondents feeling of mattering towards their relationship with their peers. Under Section C, the items include the respondents relationship with their faculty specifically with their class lecturers.

Data collection method was done via Whatsapp. Respondents were given a link, which led them to the survey. Once a sufficient number of responses had been received, the data were then analysed using the Statistical Package for the Social Sciences (SPSS)

FINDINGS AND DISCUSSION

PART A: Demographic Profile
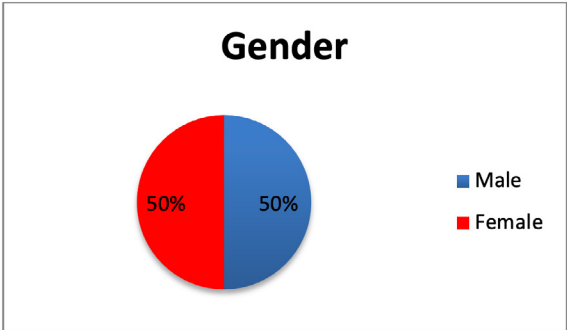
Figure 1

Figure 1 above shows the percentage of respondents in this study. Both genders showed an equal amount of 50%.
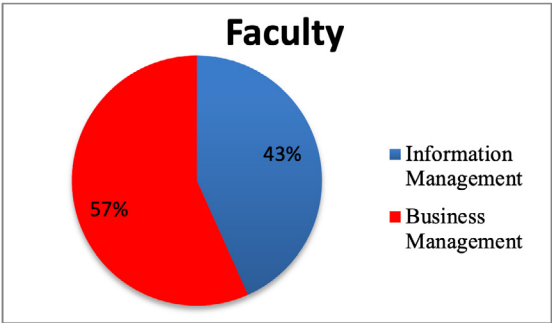
Figure 2

The bar chart above shows the programme that the respondents were enrolled in. Based on the bar chart above 43.3% were from the Information Management Faculty and the remaining (56.7%) were from the Faculty of Business Management.

RESEARCH OBJECTIVE 1:

To investigate non-traditional learners feeling of mattering towards their peers

	Mean	Std. Deviation
1. I get support from my classmates when I need it.	4.33	.711
2. I sometimes feel alone and isolated at the university.	2.67	1.241
3. The classroom atmosphere encourages me to speak out in class.	3.87	.973
4. I feel my classmates react positively to my experience and knowledge.	4.03	.809
5. I feel like I fit in my classes.	4.17	.592
6. I have a good relationship with all my classmates regardless of age.	4.17	.874
7. My classmates would help me to catch up to the new technologies if I needed it.	4.40	.621
8. Fellow students don't seem to listen to me when I share my life experiences.	2.33	1.124

Table 1

Table 1 adresses the first research objective which is to look into the non-traditional learners feeling of mattering towards their peers. Based on the findings above, it could be seen that most of the respondents have a good relationship with their peers (mean score = 4.03-4.40). They are seen to be getting support from their classmates even when they are not familiar with new technologies. Besides that, the respondents also agreed that they receive a positive experience in their classroom. Other than that, it could be seen that the respondents disagreed with the statements on feeling of isolation at the university and having peers who do not listen to them (items 2 and 8). As for item 3, although the mean score is 3.87, it is leaning closer towards the next scale, which is in agreement. Hence, it could be said here that the non-traditional learners do not feel marginalized in their classroom as they seem to have a positive relationship.

RESEARCH OBJECTIVE 2:

	Mean	Std. Deviation
9. Sometimes my questions seem to put lecturers on the defensive.	3.00	.910
10. My lecturers interpret assertiveness (having confidence or not easily frightened) as a challenge to their authority.	3.40	.932
11. My lecturers seem to recognise the younger students but not me.	2.27	1.048
12. Sometimes I feel out of date in the classroom.	2.73	1.143
13. My experience -based comments are accepted by my lecturers.	3.73	.691
14. Some of the jokes that my lecturers tell make me feel uncomfortable.	2.27	1.285
15. My lecturers sometimes ignore my comments or questions.	1.93	1.015
16. I sometimes feel that my lecturers want me to hurry up and finish speaking.	2.13	1.106

Table 2

Based on Table 2, it could be seen that there have been mixed reactions form the respondents. Items 9,10 and 13 (mean score 3.00 – 3.73) showed that respondents are being neutral. Therefore, a further study could be suggested to look into this in order to understand their response on the three statements. On the contrary, it is shown that respondents felt that they are seen in the classroom and not out dated (item 11,12,15 and 16). In addition, respondents felt that their lecturers respect them and do not make jokes that make them feel uncomfortable.

CONCLUSION

Based on the findings of this pilot study, it could be concluded that respondents felt that they matter to their peers as well as lecturers although some provided 'neutral' as their response. Hence, it is important to look into the items in order to understand the non-traditional learners better. Looking into non-traditional learners' feeling of mattering could help educators as well as the learning institution in providing them a positive learning experience as well as avoid them from feeling marginalized.

ACKNOWLEDGEMENTS

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Cite references in the text with author name/s and year of publication in parentheses ("APA Writing Style"). For one or two authors, the references should be cited as Egan (2008), (Egan, 2008), William and Lewis (2011) or (William & Lewis, 2011). For three or more authors, include only the surname of the first author followed by et al. and year of publication, e.g. Cheng et al. (2012) or (Cheng et al., 2012). For two or more papers published in the same year by the same author(s), it can be written as Cheng et al. (2012a,b). If two or more authors are cited at the same point in the text, then they are included in the same in-text citation, separated by a semicolon, e.g. (Egan, 2008; William & Lewis, 2011).

Please ensure that every reference cited in the text is also present in the

reference list (and vice versa). Maximum number of references is 20. The references should be in alphabetical order. See examples in the list of references below.

Below are examples of entries for journal article, newspaper article, article in electronic journal by DOI (no paginated version), online document, jounal article with DOI (and with page numbers), book chapter and book.

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Adaptability In Teaching And Learning During Covid-19

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Abstract: The COVID-19 pandemic has impacted traditional learning from primary to tertiary levels. UiTM lecturers were forced to embrace online learning. Academics were asked to learn, create, and implement open and distance learning (ODL) using a variety of platforms, even if they did not feel adequately prepared or had previously expressed little interest in online teaching. The primary goals of the study were to investigate their readiness for online teaching as well as the challenges they faced. Two sets of survey questions were sent to all lecturers teaching in Akademi Pengajian Bahasa, Shah Alam. The findings show that participants not only adapted to online teaching but also learned new knowledge during the online teaching and learning. Participants also stated that the main issues they encountered were internet connectivity among students and lecturers. This indicates that internet connectivity plays a major challenge during ODL. It is hoped that this research will serve as a guide for Akademi Pengajian Bahasa management in assisting lecturers who are still struggling with ODL.
Keywords: Adaptability, Challenges, Online learning

INTRODUCTION

The Coronavirus disease 2019 (COVID-19), an illness caused by a novel virus, was confirmed to have reached Malaysia in late January 2020. The COVID-19 pandemic has struck traditional learning from primary education to tertiary education. On 31 May 2020, the Ministry of Higher Education (MOHE) instructed all university lectures to conduct online teaching and learning instead of face-to face- teaching and learning until 31 December 2020. However, exceptions are given to five categories of students : First, public and private university graduate students who are involved in research. Second, students who need to use physical laboratories, workshops

and special equipment in their studies. Third, final semester/year students who are required to carry out clinical work, workshops, and use special equipment. Forth, students who do not have access to the internet and also require condusive environment for online learning. Fifth, new students for the 2020/2021 academic year in all institutions of higher learning.

In spite of the announcement by the Ministry of Higher Education, Universiti Teknologi MARA has taken the initiative to conduct online classes. Hence, UiTM moved all classes to open and distance learning (ODL) mode effective April 13 until the end of the semester for all its campuses nationwide. Open Distance Learning blend asynchronous (without real-time interaction) with synchronous (real-time interaction) online learning. UiTM lecturers were forced to embrace online teaching within a matter of weeks. Academics were asked to learn, create and implement open and distance learning (ODL) using various platforms even if they did not feel properly prepared to do so, or formerly had little interest in online teaching. Among the examples of ODL platforms identified which were suggested for use are voice message, short-message-system, phone, email, social media, live chat, learning management system and video conference application. Based on these, the main objectives of the research were to investigate lecturers' readiness in online teaching and problems faced by them.

LITERATURE REVIEW

The Covid- 19 pandemic has affected the education system globally and especially in Malaysia. Due to the shift of face to face classes to online learning classes, educators are forced to adopt suitable ways to teach their students. Within a short period of time, the educators have had to learn to prepare and conduct synchronous and asynchronous online classes. The educators are the key players in ensuring successful teaching and learning take place accordingly. They have the responsibility to ensure that students are able to comprehend the lessons taught during the on-going classes. However, there are a few issues concerning the educators in handling the online classes.

In a study conducted by Zhang et al. (2020), students and teachers in China encountered problems when studying and teaching at home. They faced

problems such as distractions, incondusive learning and teaching space, insufficient hardware and unstable network at home. In another study done by Das et al. (2021), lack of previous experience on online teaching and stress were issues faced by teachers in India. They also conducted a study in Nepal where teachers there faced power and internet problems. Meanwhile, in Indonesia, the educators encountered constraints in adapting to the use of technological tools for online learning (Redjeki et al., 2021).

Additionally, some of the issues faced by Malaysians educators are the limitation of using technology, difficulty in assessing student's work, time commitment, student's engagement and feedback for the online classes (Musa et al., 2020). In another study conducted by Mohd Yusof and Ahmad (2020), it was found that less focus by the students, unsatisfactory platform/ medium of learning and unstable internet connection for both educators and students were among the challenges faced in online distance learning at The Islamic College University, Perlis. According to Izhar et al. (2021), teachers faced issues in preparing teaching materials, having limited internet access and limited experience in using technological teaching tools.

In comparison to issues faced by educators globally and Malaysian educators, both encountered similar problems such as lacking experience on online teaching and weak internet connectivity. Therefore, these issues need to be looked into seriously as these two factors mainly contribute to the success of online teaching and learning.

In this current situation, educators need to consider suitable teaching strategies and also other external factors that play major roles to the success of online teaching (Zhang et al., 2020). Online teaching and learning involve preparing, planning and designing the lesson to ensure the objectives of the lessons are achieved. Educators are expected to brace themselves in coping and managing online classes. Thus, in some parts of the world, for example in China, teachers are provided support by the Department of Teacher Education with a resource teacher package which include online teaching strategies,information technology applications, local teacher training cases and etc (Zhang et al., 2020).

Considering the problems faced by educators in conducting online classes, it is thus important to study the challenges that hinder the success of online

teaching and learning; particularly the ones faced by educators.It is hoped the study of this research could help the educators to be aware of the obstacles faced by others , which could help them to ensure better planning for their online classes.

METHODOLOGY

A descriptive concurrent mixed-method survey type was used for the evaluation of lecturer's readiness for online learning was designed. The survey question consisted of semi-structured and open-ended question. Two set of survey questions were distributed to Akademi Pengajian Bahasa Lecturers. The first survey was conducted between 18 to 23 May and the second survey was conducted between 15 to 21 June 2020. The rationale for sending two similar surveys was to investigate if similar issues occurred before and after the semester break.

The survey was divided into three sections; demographic section, time management for online teaching and learning and issues or challenges faced by the lecturers. A total of 159 respondents participated in the first survey and 79 for the latter. The survey was distributed via Google Form to all lecturers teaching at Akademi Pengajian Bahasa, Shah Alam.

RESULTS AND DISCUSSION

The data collected from this study were gathered from 238 respondents from Survey 1 and Survey 2. Descriptive statistics are used to describe the basic features of the gathered data. The questionnaire was set to allow multiple responses from respondents. This format was set to measure respondents' readiness on the five aspects focusing on ODL which are popular platforms, time spent on synchronous mode, time spent on asynchronous mode, adaptability, and issues and challenges in embracing ODL.

4.1   Popular Platforms

Table 1 Popular platforms

Platform	Survey 1 %	Survey 2 %
WHATSAPP	92.5	94.9
GOOGLE MEET	77.4	87.2
GOOGLE CLASSROOM	69.2	79.5
TELEGRAM	22.0	20.5

Table 1 features the findings regarding the popular platforms used by the respondents. Both findings from Survey 1 and Survey 2 indicate similarities revealing WhatsApp as the most frequently used platforms. More than 90 percent respondents preferred WhatsApp in survey 1 (92.5 percent) and survey 2 (94.9 percent). The next preferred platform was Google Meet (survey 1, 77.4 percent, survey 2, 87.2 percent), followed by Google Classroom (survey 1, 69.2 percent, survey 2 ,79.5 percent) and the least preferred is Telegram (survey 1, 22 percent, survey 2, 20.5 percent). This corresponds with a study conducted by Kholis (2020) to 40 students from The English Education Department, Nahdlatul Ulama University, Indonesia. In his study on the use of WhatsApp in distance language learning during the pandemic, the findings revealed WhatsApp assisted in language learning efficiently. He reported students were able to use the app as it required minimal usage of data and was easily accessible for distance learning. Furthermore, students were said to be very responsive and motivated in their learning. Another study conducted by The Star in 2016 also reported positive usage in using WhatsApp. It was found that 97 percent of the respondents used WhatsApp regularly while the rest used it less that once monthly. The report suggested that 62 percent of the respondents in Malaysia considered mobile apps the "most important" communication service available to them on a mobile phone. The study was carried out in the last quarter of year 2015 from a sample of 5,600 respondents (The Star, 2016).

4.2   Time Spent On Synchronous Mode

Table 2 Time spent on Synchronous Mode

Time spent	Survey 1 %	Survey 2 %
More than 2 hours	11.9	14.1
1.5-2hours	32.7	24.4
1-1.5 hours	30.2	32.3
30 MIN TO 1 HR	25.2	19.2

Table 2 describes the time spent on synchronous mode teachings. The first survey revealed the time spent from 1.5 to 2 hours as the highest percentage (32.7 percent) followed with 1 to 1.5 hours (30.2 percent) as the second highest. However, this pattern was reversed for the second survey which recorded 1-1.5 hours (32.3 percent) as the highest followed with 1.5 to 2 hours (30.2 percent) as the second highest. The evidence from this finding suggests that more than half of the respondents opted for synchronous mode within 1 to 2 hours. Likewise, the second survey revealed similar findings with the first survey regarding the time spent for more than 2 hours. Both surveys recorded less than 15% respondents opted for that option. As only a small number of respondents opted for more than 2 hours of real time learning, this is a good measure to conclude that students will not be overburdened with long real-time learning hours.

Fabriz et al. (2021) carried out a survey on the impact of synchronous and asynchronous online learning to students and lecturers in a German university. The findings from teachers' perception indicate that is less notable differences between synchronous and asynchronous teaching methods. On students' perception, it was found out that synchronous teaching methods allowed more peer-centered involvement   and feedbacks.

4.3   Time Spent On Asynchronous Mode

Table 3 Time spent on Asynchronous Mode

Time spent	Survey 1 %	Survey 2 %
More than 2 hours	15.7	13.9
1.5-2hours	22.6	24.1
1-1.5 hours	22.3	41.8
30 MIN TO 1 HR	38.4	20.3

Table 3 displays the time spent on asynchronous mode teachings. The first survey revealed 30 minutes to 1 hour as the highest percentage (38.4 percent) followed with 1-1.5 hours (22.3 percent) as the second highest. However, this pattern was reversed for the second survey. Here, 1-1.5 hours (41.8 percent) was chosen as the highest whereas 1.5 to 2 hours (24.1 percent) as the second highest. For this aspect, more than half of the respondents were found to have a greater interest for asynchronous learning of within 30 minutes to 1.5 hours. With respect to this mode of teaching, it can be concluded that lecturers allow flexibility for students to digest information on their own time, which will also allow students to be more relaxed.

Rigo and Mikus (2021) carried out a study on asynchronous and synchronous in teaching English as a foreign language in Slovakia. The study used Edmodo for asynchronous and a combination of Edmodo and Google Meet for synchronous teaching learning platforms. In the study, they looked at the time spent in preparing the study materials for both modes. The findings indicated that for learning materials preparation time of within 30-60 minutes, distance learning synchronous lessons required lesser time in preparing for the materials which was 30 percent, while preparation of asynchronous learning materials was recorded as 48 percent. They restated that asynchronous mode allowed learners to be independent in managing their learning time.

4.4   Types of Challenges

Table 4 Types of challenges

Challenges/Problem		Survey 1 %	Survey 1 %
Internet	access	99	91
(Students)			
Internet	access	33.3	32.7
(Lecturer)			
Gadgets		31.8	24.4
Family		18.2	30.8
IT knowledge		24.2	16.7

Table 4 shows the proportion of survey 1 and survey 2 in their choice of challenges in facing online distance learning. There are differences and similarities in the selection of the challenges by both surveys. The biggest difference between the two surveys were factors regarding family and IT knowledge. In the selection of family, survey 1 made up 18.2 percent while survey 2 was 30.8 percent. However, the trend was reversed when it comes to IT knowledge. Survey 2 shows lower (16.7 percent) compared to survey 1 (24.2%) – this is probably because respondents were more prepared as workshops were conducted almost every week. A significant finding was found regarding the internet accessibility. Both surveys revealed the internet connection as the major challenges for students in online distance learning, while lecturers faced lesser problems compared to students which are 33.3 percent for survey 1, and 32.7 percent for survey 2. This finding suggests that the internet connectivity plays a major challenge during distance learning classes.

This finding is consistent with the study conducted by Husni Rahiem in 2021 to 80 students from The Faculty of Education of a state university in Jakarta, Indonesia. She carried out the study to determine students preferences during online learning.The finding suggested that although the students liked learning from home, one aspect the students disliked was regarding technological difficulties particularly when the internet connection was concerned. The issues of poor internet connection during COVID-19 online learning still remains

as a significant problem (Zhang et al., 2020; Mathew & Chung, 2021). A good internet connection is a prerequisite towards perfoming better during online classes as to avoid hindrances affecting the learning process.

4.5   Adaptability of ODL

With reference to the adaptability of ODL, it was found that 98.7 percent of the respondents answered YES for the first survey and 97.4 percent for the second survey respectively. The most obvious finding emerging from this outcome is that a majority of the respondents managed to adapt to ODL despite the challenges faced. This finding concurs with a study by Mardiana (2020) on her research in investigating the lecturers' adaptability to technological change and its impact on the teaching process. The result showed that 85 respondents opted to accept technological change and are willing to embrace the advanced techniques of technology.

The remaining percentage answered NO which are 1.3 percent for survey 1 and 3.6 percent for survey 2. These small numbers highlight that less than 4 percent of respondents face difficulties in adapting to ODL. Table 5 lists some of the direct quotes obtained from respondents who could not adapt to ODL.

Table 5 Reasons unable to adapt to ODL

No.	Reasons unable to adapt to ODL
1.	I am still trying to adapt to the current situation. I always use pre-recorded video of myself giving the lecture and at most of the time use the asynchronous ways of teaching.
2.	Anxiety and maybe panic attack. Sometimes with known reasons, sometimes with unknown and uncertain reasons. Never experienced this before. Stress is not the word to describe my situation. I believe that the right term is anxiety.
3.	Technical problems at the beginning of ODL. However, with the training provided by UiTM and APB, I managed to overcome this problem. The problems now is strained ayes as I need to spent more time looking at the computer.
4.	Problems with laptop/phone

5.	I feel that ODL requires more time for preparation to make it more interesting.

It can be cautiously deduced from Table 5 that the factors highlighted are basically due to lack of readiness in embracing ODL particularly in terms of technology readiness. As the percentage is only minimal (less than 5 percent), it can be concluded that respondents in this study are ready to adapt to the new norm. Technology readiness is very pertinent in ensuring a successful online learning (Husni Rahiem, 2021). Mathew and Chung (2021) depicted that it is without a doubt that lecturers face problems in adjusting to the new norm as the majority of them are first timers embracing ODL. Unstable network with 'connect and disconnect' episodes during synchronous lectures to name a few, will lead to the disrupted process of teaching and learning (Zhang et al., 2020). Technology readiness is a significant criteria in ensuring the success of e-learning implementation. With adequate facilities, more practices and trainings, lecturers will be able to execute ODL well (Mardiana, 2020).

4.6   Other issues/challenges faced by the respondents with regard to their students.

Besides the above-mentioned problems in adapting with ODL, there are some other issues gathered from respondents regarding their students. Table 6 shows the direct quotes obtained from respondents regarding their students in adapting with ODL.

Table 6 Other issue/challenges faced by the respondents regarding their students

No	Other issue/challenges faced by the respondents with their regard to their students
1	Identifying students who were online but not active. Some tend to send messages late because of internet problems/issues
2	Students' commitment and participation. They were also mentally tired.
3	Students' attitude. Only a few answered question when asked.

4	The students themselves may have problems adjusting to the asynchronous platform as they would join in at 9.00 am or later for classes that start at 8.00 am.
5	Lack of motivation among the students due to internet problems.

Based on Table 6, some issues notified are pertaining to students experiencing internet problems, students' motivation and students attitude in adjusting to ODL. The overall evidence from the factors are basically due to lack of readiness in adapting to ODL. Sim et al. (2021) carried out a survey on 156 students focusing on challenges during online learning to a public university in Sarawak. Among the challenges found were issues on internet connection, students' attitude, struggles and stress of online learning mode. It is crucially important to address these problems in order to ensure students' engagement and motivation in learning are not distorted. Readiness and obtaining high motivation in e-learning is a crucial factor for students. They must possess positive mindset and motivation in embracing the new norm (Hamzah et al., 2021). By highlighting the problems, some efforts can be carried out to reduce the obstacles in teaching and learning. Consequently, the quality of ODL could be enhanced for both students and lecturers.

CONCLUSION

Switching from traditional classroom and face to face lessons to open and distance learning (ODL) make the teaching and learning experience entirely differently not only for students but also lecturers. Lecturers are required to adjust and adapt to the new norm in teaching and learning. Students also need to change their mindset- they need to accept ODL with open hearts to experience meaningful outcomes.

Lecturers are not able to conduct online classes in synchronous mode most of the time due to limited internet access or probably low bandwidth experienced by the students. In addition, some students also do not own computers for online learning. Therefore, lecturers who teach these students should identify the problems and find more suitable platforms to be used. Time management is an important issue in ODL for both lecturers

and students. Online courses require a lot of time and intensive work. In addition, both parties also will be occupied not only with classes but also other daily commitments. Thus, it is advisable to have a schedule or regular planner to help as reminders for their class activities and deadlines.

Lecturers also can act as motivators and counselors to students who are not motivated to learn in ODL mode. They need to encourage the students to face challenges for their future. Although it is hard to learn through a fully online mode, they need to learn that ODL is a necessity in this pandemic outbreak. In a nutshell, for more conclusive results, future research can be carried out in getting insights from both lecturers and students, particularly in the form of a revisit after a year of embracing online learning and ODL implementation.

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The Effectiveness of Gamification through Classroom Leaderboards for Student Engagement

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*Abstract: Universities, researchers and practitioners are looking for effective ways to engage, enhance, and promote students' learning in the classroom. Gamification is the integration of game-like design elements into non-game context to motivate action, engage, and solve problems. This paper presents the effectiveness of gamification through leaderboards to improve student engagement in subjects for Company Website Design (EIC552) and Communication through Drama (EPE530) at Akademi Pengajian Bahasa, Universiti Teknologi MARA. Questionnaires were given to examine the effects of gamification on student learning and engagement. Results suggest that gamification through leaderboards are effective in improving student participation and encouraging extracurricular learning.
Keywords: Gamification, Technology, Learner Engagement, 21st Century Learning*

INTRODUCTION

Teaching and learning is a process that sees the transfer of knowledge from the teacher to the learner. To do this effectively, there are principles that would commonly guide the process. Tiberius and Tipping (1990) have lined up 12 principles which begin with the teacher's knowledge of the subject matter to conduct the teaching. This is followed by principles such as the student's active involvement which enhances the learning, interaction between the teacher and the students, students taking charge of their own

learning, diversifying the approaches to learning, establishing an atmosphere of cooperation and collaboration of ideas, as well as making the material meaningful and getting feedback for both the teacher and learners. These principles suggest that effective teaching and learning requires active and interactive participation in which the teacher uses their knowledge and skills to come up with engaging lessons that would induce learning and responses. Hence, student engagement is the key and goal in teaching and learning.

Student engagement according to Astin (1984) is how much energy is put into the academic experience by the student, both physically and psychologically (cited in Ablia & Fraumeni, 2019). In relation to the previously mentioned principles of effective teaching and learning, this definition of student engagement also needs to include the teacher's crucial roles in determining appropriate content which will spur student engagement. In teaching and learning, student engagement is vital as the teacher looks for affirmation that the student is 'learning'. A common belief is that students successfully learn or learn better if they show that they are interested in, or enjoy the lesson, or just appear to be more immersed in the lesson. Marks (2000, cited in Ablia and Fraumeni, 2019) has observed that the likelihood of students learning, and finding school experience rewarding apart from being likely to finish school and pursuing higher education, are closely related to their engagement with school. In short, it is believed that student engagement is vital and searching for the best approaches to deliver the lesson is what a teacher strives for.

With the recent global pandemic, the need for more effective teaching and learning via online platforms has never been more pressing. Learning institutions from preschool to tertiary levels have adjusted and adapted their teaching syllabus to suit the unprecedented situation as well as to prepare for similar circumstances. Online teaching and learning is the most suitable means to ensure that education does not stop just because students are no longer in a physical classroom together with the teacher.

STATEMENT OF PROBLEM

With the increase of wide-ranging online platforms to use in teaching and learning, educators may be spoilt for choice but there are significant concerns. Among them are issues such as merely adapting and utilising practices that are originally for face-to-face into online context or 'one size fits all' as claimed by Gillett-Swan (2017). Furthermore, during the earlier stage of the Covid-19 pandemic and mandatory government-sanctioned ruling to stay home, internet connectivity was also a major issue in certain areas in Malaysia as well as issues on online learning apprehensions among university students as found in a study by Nur Salina et al (2020).

These online learning issues are mostly still relevant as situations may not have improved much. However, it is also critical to delve into how students learn and respond to learning via the online method. The popularity of virtual or remote learning as a response to the Covid-19 crisis has also brought up questions on how involved and how engaged students are during online lessons. In relation to the issue, Gray and DiLoreto (2016) said that the sense of being disengaged to classmates and instructors is one of the challenges of online learning. The authors further mentioned the necessity of having pedagogical strategies for course delivery to ensure as much as possible opportunities to learn and be engaged in the online classes.

Gamification may not be a new approach in the learning environment, but its concept continues to be relevant in ensuring a fun and interactive learning. This method of learning is now even more applicable with online learning to encourage learner engagement. Therefore, the study hopes to investigate matters pertaining to the use and effectiveness of Gamification through Classroom Leaderboards for student engagement based on the following research questions:

> RQ 1: What are the students' perceptions of classroom gamification?
> RQ2: How does gamification through classroom leaderboards create online engagement for the students?

LITERATURE REVIEW

3.1 Gamification in educational setting

The concept of gamification in education is gaining attention as an area of study in recent years. Research described gamification as the application of gaming mechanics and infusing them into non-gaming scenarios (Hanus & Fox, 2015). Gamification in education as explained by AL-Azawi et al. (2016), is when elements, structures and principles of gamification are used in educational settings. They further explained that gamification in education is achievable and affordable as compared to other educational methods; problem-based learning and learner-centered learning; because it encourages students to take up challenges without fear of failure. In a learning context, this could involve adding points, badges, and leaderboards to the institution's learning management system LMS or classroom (Koivisto & Hamari, 2019; Majuri, Koivisto, & Hamari, 2018; Seaborn & Fels, 2015; Hamari et al., 2014). The aim of points, badges and leaderboards is to promote engagement and fun learning experience among students (Deterding, Nicke, O'Hara & Dixon, 2011 and Gamification, 2010) and it was perceived that the badges they collected highlight their social status to their peers (Hamari, 2015). A study conducted showed that gamification concepts with badges and progress bars were used as a tool for online learning. The study by Bovermann, Weidlich and Bastiaens (2018) mentioned that badges were used for direct feedback and recognitions of the students' effort and at the same time foster motivation for ODL, and progress bars were used as a way to manage their studies and monitor their mastery in an online environment.

3.2 Leaderboard as a gamification tool

Leaderboard is one of the design elements of gamification, with the aim to improve productivity, engagement and learning. The simplest form of leaderboard displays a high score list, and ranks users according to their relative achievements, measuring against their peers through certain criteria (Christy & Fox 2014; Butler, 2013). The two types of

leaderboards used are called 'absolute' and 'relative', where absolute displays and covers all content for all users, including the users' scores and their details, which makes top users feel a sense of accomplishment as compared to the latter type; where it ranks users below and above them, making the latter type less meaningful (Ortiz-Rojas, Chiluzia & Valcke, 2019). When used in an educational setting, students can use their position on the leaderboard and assess their own performance with respect to their peers in the classroom.

3.3   Students Engagement

Through leaderboards, the classroom community benefits through social exchange and competition thus facilitating social interactions (Kim et al. 2018).
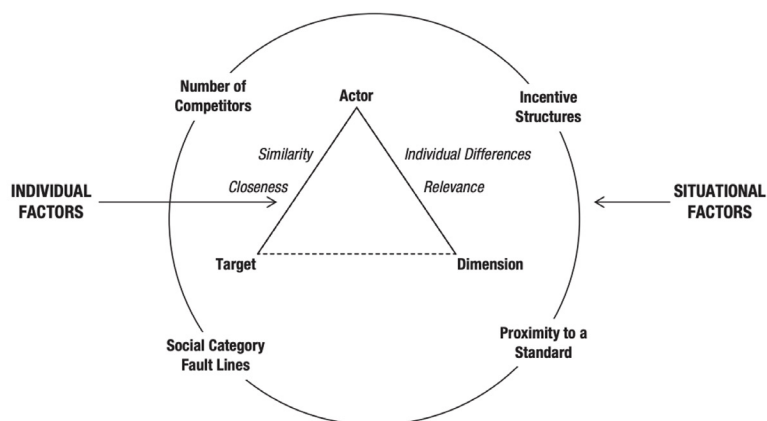
Fig 1: The Social Comparison Model of Competition (Garcia, et. al., 2013)

Students understand their abilities (behaviours, opinions, status and success) better and have a better assessment of themselves when they see how they are being compared to others. Leaderboards provide the means for students to compare themselves, where it motivates them to explore, engage in activities so they 'be on top', because it provides them with a sense of accomplishment and status

(Ortiz-Rojas et al, 2019; Garcia, Tor And Schiff, 2013). Motivation is a fundamental element of students' learning, and it is a "process whereby goal directed activity is instigated and sustained" (Valerio, 2012). According to Self-Determination Theory (SDT), there are two types of motivation affordance in gamification; extrinsic and intrinsic motivation (Ryan & Deci, 2000). Intrinsic motivation, associated with student engagement, is where students "play, explore and engage in activities for the inherent fun, challenge and excitement of doing so" (Niemiec & Ryan, 2009). Positive human tendency to move towards growth is the intrinsic motivation in this context, and is facilitated through three core needs; autonomy, competence and relatedness (Ortiz-Rojas et al, 2019; Ryan & Deci, 2000).
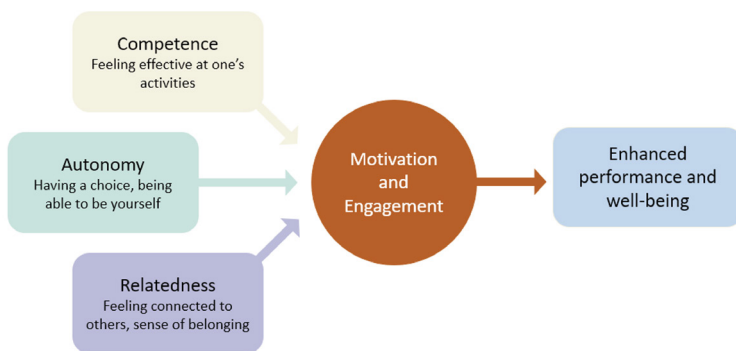
Fig 2: Self-Determination Theory (Ryan & Deci, 2000)

In a gamified setting, autonomy happens when players choose what activities they want to carry out (Werbach & Hunter, 2012), thus giving them the choice to chart their own path or intentions. Competence is defined as abilities, proficiencies, or skills that are necessary to reach a specific goal (Smelser & Baltes, 2001). With the gaming mechanics found in leaderboards, immediate feedback is given through student scores or ranking based on the activities' results (Sailer et al, 2017; Aparicio et al, 2012). These game mechanics in leaderboards support intrinsic motivation, students' perception of information and mastery of knowledge and skills (Mekler, et al 2017). According to Ryan and Deci (2000), relatedness refers to the sense of connection with others;

where students see the performance of one another and as classmates, compare and share progress and discuss positions (Shi & Cristen, 2016; Sailer et al, 2013). These three elements are important for understanding the what (content) and why (process) of goal-directed behavior and must be present for effective gamification strategies (Ryan & Deci, 2000).

METHOD

This study involved 34 semester 4 and semester 5 students of Bachelor of Applied Language Studies (Hons.) English for Intercultural Communication program, from the Akademi Pengajian Bahasa, Universiti Teknologi MARA, who attended classes for 14 weeks.

The online questionnaire was adapted and developed from the Technology Acceptance Model (TAM) by Davis et al. (1989) and items proposed in the Student Course Engagement Questionnaire (SCEQ) by Handelsman et al. (2005), to measure students' engagement. TAM is an information system model that theorizes the process of acceptance and the usage of technology where users' decision to accept and use a new technology (A) relies on these two major factors; perceived usefulness (PU) and perceived ease of use (PEOU). The questionnaire consisted of four sections; (i) Perceived Usefulness (PU), (ii) Perceived Ease Of Use (PEOU), (iii) Attitude towards gamification (A) and (iv) Student Engagement (SE); with 21 likert-scale items: strongly agree (SA), agree (A), undecided (UD), disagree (D) and strongly disagree (SD).

The reliability of the constructs used in the instrument was tested using SPSS based on the 34 responses. The internal consistency of the instruments was measured using Cronbach's alpha and the results showed an acceptable value of above 0.7 thresholds for all constructs as shown in Table 4.2.

Table 1. Cronbach alpha reliability measurement scales

Construct/ Variables	Cronbach's Alpha	N of Items
Perceived Usefulness (PU)	0.931	4
Perceived Ease Of Use (PEOU)	0.827	5
Attitude (A)	0.922	4
Skill Engagement (SKE)	0.924	8
Student Engagement (SE)	0.924	5

The classroom leaderboards lasted 14 weeks and were designed, developed and implemented for both classes, EIC552 (Company Website Design) and EPE530 (Communication through Drama), in the context of regular courses. In order to support progress, mastery and recognition, progress bars, points, and challenges were chosen as gaming elements as these features were expected to lead to learner engagement, motivation and interaction (Hakulinen et al, 2015; Utomo & Santoso, 2015; Werbach & Hunter, 2012).
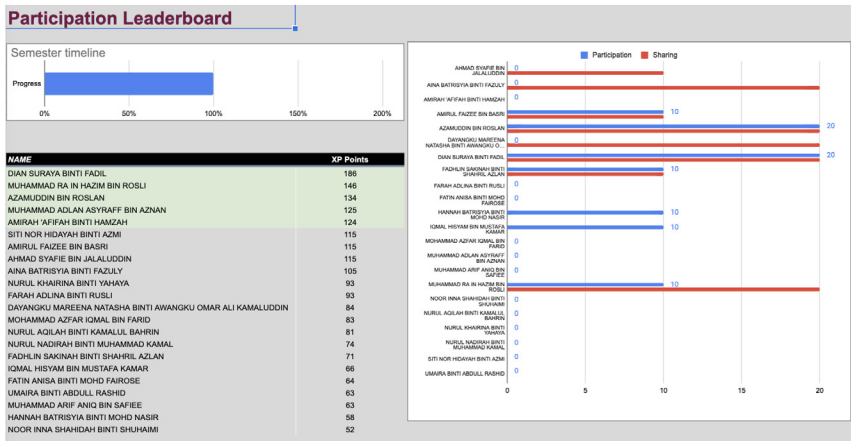
Figure 3: Classroom leaderboard that shows progress bars and XP points collected

The students were briefed about the classroom leaderboard early in the semester about ways for collecting and redeeming XP points. The progress bars were visible for everyone in the classroom and were matched to the amount of participation and contribution from the live-class or Google Classrooms, thus indicating evidence of engagement as shown in Fig. 3.

Figure 4: Various gamification features incorporated in the classroom leaderboard

Figure 5: Optional activities to collect XP Points.

Gaming elements, such as points, badges, missions or challenges are widely used in educational settings. Because learning is a difficult process that requires motivation and persistence, most gamification platforms use these elements to keep the learners interested and motivated all the time. Missions or challenges work as powerful motivators for learners as these game elements are able to make the learning process more exciting, and dynamic. To encourage participation, it is a good idea to use a reward system to keep learners motivated. For the leaderboard, the awarding of XP points were given for the completion of various tasks and activities within the 14 weeks; from live-class participation, perfect attendance, completing

weekly challenges, and other activities outside of the classrooms endorsed by the instructor (see Fig. 4). Students were encouraged to complete these activities, although optional. The compulsory activities did not contribute to getting XP points- however, any late submission would result in XP points penalty. The optional and compulsory activities were both posted on Google Classroom, but both activities were placed in different headings (ie: Challenges or Course Work) (see Fig. 5).

How to earn XP points?	XP
Ask questions in class that helps moves forward the learning outcome	5
Share insightful comments that adds depth & substance to the topics	10
Submit assignments early	10
Weekly challenges	10
Participate in organised events	20
Group Dynamics (perfect ratings)	30
Perfect attendance (attend webex early & sign attendance GC on time)	30
Certification	20
Late Submissions	-10
XP STORE	
Deadline Extension of graded assignments/ assessments	-150
Retake graded assignment/ assessment	-250

Figure 6: Ways XP points can be collected and redeemed

Learners were allowed to redeem their XP points on deadline extensions or retake assessments provided they have enough XP points to redeem (see Fig. 6). At the end of the 14 weeks, the top 5 XP scorers were rewarded by their instructors.
Results

Table 4. Results for Attitude towards Classroom leaderboards

ATTITUDE (A)	SA	A	UD	D	SD
I think using Classroom leaderboards is a good idea	27.3	51.5	9.1	6.1	6.1
I like learning with Classroom leaderboards	30.3	45.5	9.1	9.1	6.1
I look forward to those aspects in my learning that require the use of Classroom leaderboards	27.3	48.5	18.2	6.1	0.0
I look forward to earning XP Points	36.4	33.3	21.2	6.1	3.0

Table 4 shows the results of the respondents' attitude towards the classroom

leaderboards. 52% of the respondents think that classroom leaderboards are a good idea, 49% of the respondents look forward to learning that requires the use of classroom leaderboards and 46% of the respondents enjoy learning with the classroom leaderboards. The result also showed that 36% of the respondents look forward to earning XP points. Overall, the respondents' attitude towards classroom leaderboards is between agree and strongly agree.

Table 5. Results for student engagement

STUDENT ENGAGEMENT (SE)	SA	A	UD	D	SD
Classroom leaderboards encourage me in attending classes regularly	42.4	33.3	15.2	9.1	0.0
Classroom leaderboards encourage me in listening carefully in class	33.3	45.5	15.2	6.1	0.0
Classroom leaderboards encourage me in making sure to study on regular basis	33.3	42.4	15.2	9.1	0.0
Classroom leaderboards contribute to me in having fun in the classroom	48.5	42.4	3.0	6.1	0.0
Classroom leaderboards contribute to me in learning new concepts	36.4	57.6	3.0	3.0	0.0
Classroom leaderboards contribute to me in participating actively in classroom discussions	33.3	51.5	9.1	6.1	0.0
Classroom leaderboards contribute to me in creating a healthy competition among my classmates	48.5	42.4	3.0	6.1	0.0
Classroom leaderboards contribute to me in asking questions when I did not understand the lecturer	42.4	33.3	21.2	3.0	0.0

Table 5 shows the result of students' engagement when using the classroom leaderboards. This shows that overall, the respondents agreed and that they felt engagement when using the classroom leaderboards in the classroom. 58% of the respondents agreed that the classroom leaderboards contribute to them learning new concepts. In addition, 49% of the respondents strongly agreed that the classroom leaderboards contributed to them having fun in the classrooms and created a healthy competition among their classmates. All in all, students participating in the survey reported a high agreement on engagement in relation to classroom activities in the gamified learning environment.

The results showed how gamifying a course using classroom leaderboard led to an increase in students' online engagement.

DISCUSSION

Results of the study suggest that better student engagement is possible when a course is delivered through gamification. Students who took part in the classroom leaderboard viewed the experience positively. This is in agreement with what was mentioned by Deterding, Nicke, O'Hara and Dixon (2010) and Gamification (2010) where the intent of collecting points, badges and leaderboards is to encourage engagement and fun learning experience among students. Students feel motivated to participate and take charge of their learning when they are rewarded accordingly. In other words, when learning turns into a fun game, students feel more willing to compete with each other. This is in accordance with Ortiz-Rojas et al. (2019) and Garcia, Tor and Schiff (2013) where it is said that leaderboards provide the motivation for students to explore and engage in activities to emerge as the top competitor and subsequently allows them to feel accomplished. More significantly, when students immerse themselves willingly in the classroom leaderboard activity, extrinsic and intrinsic motivation emerge, as stated by The Self-Determination Theory (SDT) (Ryan & Desi, 2000). Additionally, feedback received from the participants support the theory that gamification of the course fulfilled the elements of autonomy, competence, and relatedness.

CONCLUSION AND RECOMMENDATIONS

This study discovered that students benefited from using classroom leaderboards. This gamification method reveals that student engagement does not rely on expensive software and applications. The teacher/lecturer can instead simply turn an entire course into independent quests to seek information, complete tasks, and gain points which construe as fun and learning along the way. Findings of the study also support theories related to gamification and student engagement. It is therefore recommended that in any lessons or courses, elements of gamifications could be included to create better student engagement. In addition, course creators could study

and identify aspects of the course that can be gamified and explicate these in their course documents. All in all, gamification is an effective method of promoting and enhancing student engagement and can be further explored to be used in other areas beyond the classroom.

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An Exploratory Study of a Conceptual Framework for Developing Micro-Credential Courses in Malaysian Higher Education Institutions

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Abstract: The rapid growth of technology and digitalization has led to a new model of learning known as micro-credential to reorient Higher Education Institutions and prepare graduates for work related skills in the 21st century. Even with much attention and support from the Malaysian Government, there is, however, still a lack of consensus for proper implementation of micro-credentials in Higher Education Institutions due to its infancy stage. Using grounded theory and qualitative content analysis, a conceptual framework was developed with three main themes emerging. These are; (1) learning principles, (2) e- learning theories and models and (3) assessment principles with reference to micro- credentials. The creation of this conceptual framework intends to help guide practitioners in the development of micro-credential courses in Higher Education Institutions in Malaysia. Key terms: Exploratory, micro-credential, conceptual framework, e-learning, learning principles, assessment principles

INTRODUCTION

Micro-credential (MC) is a form of online, on-demand certification earned through demonstrating skills, knowledge and competencies in a specific area at a time. Wheelahan & Moodie (2021) defined MC as "industry-aligned short units of learning that are certified or credentialed, that counts towards a higher education qualification". They are earned either through credit or non-credit courses in a form of short stackable courses, learn-

by-doing processes or evidence submission to demonstrate the specific skills for undergraduates, graduates, non-traditional students and working professionals (Gallagher, 2019; Rossiter & Tynan, 2019; Fong, Janzow & Peck, 2016). In addition, MC differs from traditional degrees and certificates as it is completed in a short period of time while providing personalised learning context and flexibility (as it is normally delivered through online platforms) in achieving the learning outcomes (Hanafy, 2020, Hunt et al, 2020; Malaysian Qualifications Agency, 2019 & Crow & Pipkin, 2017). Upon completion, learners earn digital badges or digital certificates that contain meta-data which verifies mastery of these specific skills, knowledge and competencies.

Although there have been numerous contributions related to micro-credentials design, implementations and assessment (Lim et al, 2018; Jeantet, 2018; Song, 2018; Carey & Stefaniak, 2018; and Hall-Ellis, 2016), there is still no definite term of what constitutes a micro-credential in terms of period of study, principal characteristics or specific forms of assessment and award system (Kato et al, 2020; Chakroun & Keevy, 2018; Rossiter & Tynan, 2019). This is especially challenging for Malaysian Higher Education Institutions (HEIs) as they need to develop micro-credentials to ensure their graduates not only have 21st century skills once they graduate but also the competencies that meet the demands of the future workforce.

Currently, the only framework available for micro-credential development is the Common Microcredential Framework (CMF), which was based on the European Qualification Framework. CMF is used in over 400 HEI across Europe, for the purpose of standardizing portable digital certification through flexible learning. Due to the differences in the national qualification framework (MQA) and the European Qualifications Framework (EQF), CMF is not suitable for Malaysians HEIs. For instance, MQF guidelines on the qualification level for micro-credential awardance must be at APEL (C); whereas CMF has outlined that learners must be at level 6 or 7 in the EQF. APEL (Accreditation of Prior Experiential Learning) is a formal and informal learning evaluation process of a learner based on cumulative experiences; such as knowledge and skills to obtain credit transfer for course(s) in the programme enrolled. Currently it can be used for entry requirements for Malaysia HEI programs such as certificate (level 3), Diploma (level 4), Bachelor's (level 6), and MAster's (level 7).

The purpose of this paper is to develop a micro-credential conceptual framework that would be the basis for designing and developing a Micro-Credential for Malaysian HEIs.

RELATED WORKS

A learning theory is meant to explain and help us understand how learners learn. Four most popular learning theories are behaviorism, cognitivism, social constructivism and multiple intelligence. Behaviorism focuses on how learners behave and how they respond to certain stimuli, then when repeated, can be assessed, quantified and controlled for each learner. Watson, following Pavlov's work, coined the term behaviorism and argued that the learning process involves stimulus and responses as compared to mind and consciousness. Skinner introduced the term operant conditioning that emphasized positive and negative reinforcement (helps learners learn new behaviours), which had significant influence on computer assisted instruction (CAI). Reliance on encouragement and repetition was a common element in early CAI programs as it promotes positive learning activities.
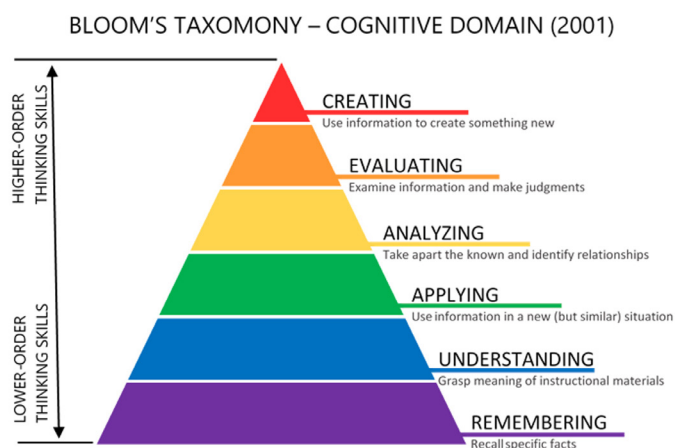
Figure 1: Bloom's Taxonomy (Blooms & Krathwohl, 1956; Krathwohl, 2002)

Cognitivism believes that the mind (such as motivation and imagination) has an important role in the learning process and focuses on the interaction

between the occurrences of environmental stimuli and learners' responses. Proponents of cognitivism argued that the creative mental process, levels of cognitive levels and the acquisition of knowledge is not observable in the physical world. Bloom's taxonomy (1956) as shown in Fig. 1, emerged as a tool for curriculum development for charting skills related to the development of intellectual and higher order thinking skills. In addition, Gagné's 9 Events of Instructions, a cognitivists instructional design, outlines the objectives and strategies for the design of instructional material. [See Fig. 2]
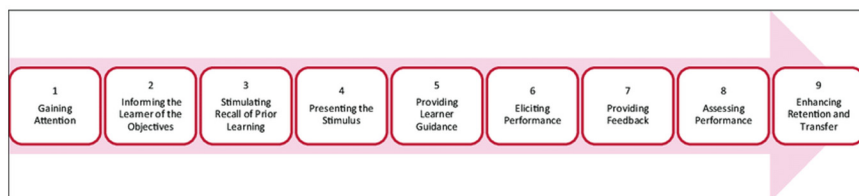
Figure 2 : Gagné's 9 Events of Instructions (Gagné, 1985)

Constructivism describes teaching and learning as a complex interactive social phenomenon between the instructor and the learner. In the constructivism approach, learning takes place when learners are in the "zone of proximal development", in which the learner constructs with more knowledgeable peers the knowledge necessary to solve the problem (Vygotsky). Additionally, constructivists believe that learners learn by doing, collaborating and reflecting with their peers (Dewey), which is very much evident in the present day classroom context. Furthermore, adults, seeking to enhance their professional knowledge or learn out of curiosity, learn through social context and experiences, either from traditional programs, continuing education programs, competency-based learning or professional development in HEIs (Knowles, 1998).

Figure 3: Gardner's Theory of Multiple Intelligences, (Gardner, 1999)

The Multiple intelligence theory proposes that intelligence consists of multiple entities used by learners in different situations and proportions to understand and learn about the world. The eight basic intelligences outlined are; linguistic, logical/mathematical, spatial, musical, bodily kinesthetic, interpersonal, intrapersonal, naturalistic, and existential as shown in Fig. 3 (Gardner, 1999). This theory sparked the design of multiple learning modalities which allow learners to engage in learning in ways they prefer, according to their ability. According to the multiple intelligence theory, learning is an evolutionary process (where learners move from one place, subject etc to another) - this sparked a framework for multimodal instructional design that relies on a variety of pedagogical techniques, delivery approaches and multimedia elements (Willingham, 2008).

2.1   Learning Approaches in an Online Environment

This section presents several theories in terms of its appropriateness for designing and developing a framework for micro-credential in Malaysia's HEIs. As most micro-credentials are available through an online learning platform, the responsibility for learning shifts primarily from the instructor to the learners.

Connectivism is a learning model that suggests learners should combine knowledge, thoughts, theories and general information in a useful manner and acknowledge that technology and information flow have a major part in the learning process. Due to the constant connectedness, it gives learners opportunities to make choices about their own learning, and at the same time promotes collaboration, discussions and showcases learning artefacts through various online activities. Connectivism believes that learning happens through social media, online networks, blogs, or information databases. Siemens (2004) describes connectivism as the "integration of principles explored by chaos, network, complexity and self-organization theories". He argued that due to the volatile nature of information explosion, what must be learned is determined by others and that learners need to unlearn what they've learned in the past and learn how to learn and evaluate new information online.

In addition, in an online environment, students are accountable for their own learning and how they learn it (Swan, Garrison & Richardson, 2009). Effective online learning for higher order skills are dependent on community's development (Swan et al, 2009). Based on a constructivist approach to learning in higher education, (Garrison, 2007), where community produces knowledge, a Community of Inquiry Model describes how "meaningful learning takes place for a group of individual learners through educational experience that occurs at the intersection of social, cognitive and teaching presence. Social presence is the "ability to identify and communicate with the community and develop interpersonal relationships". Cognitive presence is defined as the "extent to which learners construct and confirm meaning through sustained reflection and discourse in a critical Community of Inquiry". Teaching presence is defined as the "design, facilitation and direction of cognitive and social presence for the purpose of realizing the relevant learning outcome (Garrison, 2009; Garrison, Anderson & Archer, 1999). The integration of any technology into online courses varies from choosing the appropriate applications, to the use of digital spaces for supplementing course content. Elements of the Community of Inquiry model helps learners and explains how technology can be applied in an online environment.

2.2   Learning approaches to Micro-Credential

Micro-learning emerged as a result of micro-credentials, which delivers topics that are difficult in bite-size training modules, or small units and uses short-term-focus activities used to acquire knowledge, skills and abilities which happen on a daily basis (Jomah et al, 2016; Hug, 2005). This type of learning is suitable for an online learning environment as they are targeted, self-paced, concise, highly modular, flexible and on-demand, which is needed in view of medial, societal and constant environmental change (Job & Ogalo, 2012). Complexities of learning are broken down and students get immediate feedback after each unit (Bell & Mladenovic, 2008; I'Anson et al., 2003; Paintal, 1980). Micro-learning experience proved successful and showed a high acceptance rate when integrated into the learners' daily routine as compared to e-learning experience (Jomah et al, 2016; Gassler, Hug & Glahn, 2010).

Competency-based learning is defined as a system of instructions, assessments and reporting of student learning and achievements in demonstrating the target skills and abilities. Competency-based learning is a widely used approach in micro-credentials and micro-learning to help learners improve their skills, and knowledge; mastering these skills is the general goal. Current employers are looking for graduates who possess competencies that are relevant to the hiring position, thus forcing HEIs to shift their courses to meet the employers demand (Lim et al, 2018, Baughman, Brumm, Mickelson, 2012; Voorhees, 2001). However, there were some concerns outlined in employing competency-based learning in micro-credentials for HEIs. Voorhes (2001), argued that with bundling and unbundling micro-learning units, there needs to be a common understanding of what competency is being assessed and the performance standards.

In order to ensure key stakeholders benefit from the development and implementation of the micro-credentials, The Malaysian Qualification Agency (2019) outlined six principles for HEIs to adhere to; (1) outcome-based, (2) personalised, (3) on-demand & industry driven, (4) secure and shareable, (5) transparency and (6) naming convention. In the context of "on-demand & industry driven", the micro-credential

must be context-based. In line with the constructivist view of learning, context-based learning is described as a type of active learning, where learners are expected to have autonomy over their own learning, where authentic situations (context) are provided as a starting point for learning the content matter (concepts) (Gilbert & Treagust, 2009; Gilbert, 2006; Parchmann et al 2006). Gilbert (2006), outlined the nature of context used in context-based learning as;

a setting within which mental encounters with focal events are situated; a behavioural environment of the encounters, the way that the task(s), related to the focal event, have been addressed, is used to frame the talk that then takes place; the use of specific language, as the talk associated with the focal event that takes place; a relationship to extra-situational background knowledge

Personalised learning is one component for an effective micro-credential ecosystem (Malaysian Qualification Agency, 2019; Berry, Airhart and Byrd, 2016). Personalised learning is learner-centered, where it provides learners agency over their own learning, achieving their own learning goals by deciding how, when and where they learn (Harkema & Schout, 2008; Jones & English, 2004). Learner-centered is an educational approach that aims to customize student's learning while using various strategies to engage and develop their target skills and competencies, and at the same time make learners take responsibility for their own learnings. Through this approach, learners' motivation increases since they have some control over their learning, and their retention also increases since they become more aware of what and why they are learning (Weimer, 2011), which is the main core business for micro-credential - a tailored learning to learner's career goals and responsibilities.

2.3   Assessments in an Online Environment

Assessment is crucial to education and all learning activities. Biggs and Tang (2007) mentioned that assessment tasks and teaching-learning activities must be aligned to "ensure students achieve the intended learning outcomes and develop cognitive abilities at a range of levels".

The two types of assessments are; summative and formative, in which summative assessments are high-stakes activities that have more impact on the students' grades as compared to formative assessments, where low-stakes activities are used to gauge students progress to what extent a student is learning a concept, skill, or knowledge set, towards the completion of the course outcomes. To ensure that students develop all of the intended learning outcomes and for students to demonstrate their learning, instructors can use a range of assessment types. The aim of assessment is to provide feedback on the learners' progress and help them identify their readiness for the next level. Online assessment provides the flexibility for allowing learners to take them at their convenience, and this is ideal as micro-credentials are offered in an online platform.

According to Robles and Braathen (2002), online assessment is a system for evaluating students' achievements, as there are various components to measure; such as online peer-to-peer interactions, learner-to-instructor interactions, participation, and learning outcomes. As mentioned in the guideline by Malaysian Qualifications Agency (2020), micro-credential providers are to ensure skills, knowledge, attitudes and competencies gained are reported and measured through appropriate and suitable assessments methods for formative, diagnostic and summative purposes. Outcome-based assessment is defined as a collection of evidence on learners' achievements or progress based on outcomes and competencies, and are obtained through various alternative assessment methods such as portfolios, observations, projects and self-assessments (Malaysian Qualification Agency, 2019; Brindly, 2001, Brown and Hudson, 1998). Transparency in reporting, alignment of teaching and curriculum goals and sensitivity to learners' needs are some advantages of outcome-based assessments.

In terms of assessment methods, Gayton and McEwan (2007) interviewed online instructors and found projects, portfolios, self-assessments, peer evaluations, time tests and quizzes and asynchronous discussions to be effective in an online environment. Other popular assessment methods for online courses are online discussions, written assignments, quizzes and tests, and instructors need to use a variety of assessment methods to accurately and thoroughly assess the learners

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(Swan, 2001; Arend, 2007; Robles & Braathen, 2002).

Once learners have fulfilled the criteria required to pass the assessment, credentials or certifications will be awarded- however due to the nature of digital credentials, there are challenges such as security, authentication, integration and management. Blockchain based education systems might address these challenges as it provides a way of verifying the credentials of a learner based on the global network of employees, employers, micro-credential issuers and learners who have personal access to their portfolio of diverse range of skills, knowledge and competencies (Bhaskar, Tiwari & Joshi, 2020). A study conducted by Turkanovi et al (2018), used blockchain technology to create a global decentralized platform for managing, assigning and presenting digital credentials for learners and issuing bodies; such as HEIs, employers or organisations. Blockchain technology is a tool to manage electronic data that supports transparency and accountability. It is also a way to keep digital assets unalterable and transparent through the use of decentralization and cryptographic hashing. The process of the development and deployment of any digital services such as awarding micro-credentials are modernised, secured and made effective through the use of blockchain technology (Turkanovi et al, 2018). Various research has proven the great potential when adopting blockchain technology in the education sector – however, barriers such as scalability, cost and security still need attention (Alammary et al., 2019; Turkanovi et al., 2018).

METHODS

The conceptual framework is based on reviewing related literature and published guidelines and standards discussing the design, development and implementation of micro-credentials. The learning approaches, guidelines and standards were consolidated to develop a conceptual framework for designing and developing a Micro-Credential for Malaysian HEIs.

RESULTS

Based on the literature, a conceptual framework for designing micro-credential is developed. The following diagram (Fig. 4) shows the tentative model of the conceptual framework in the development of a micro-credential.
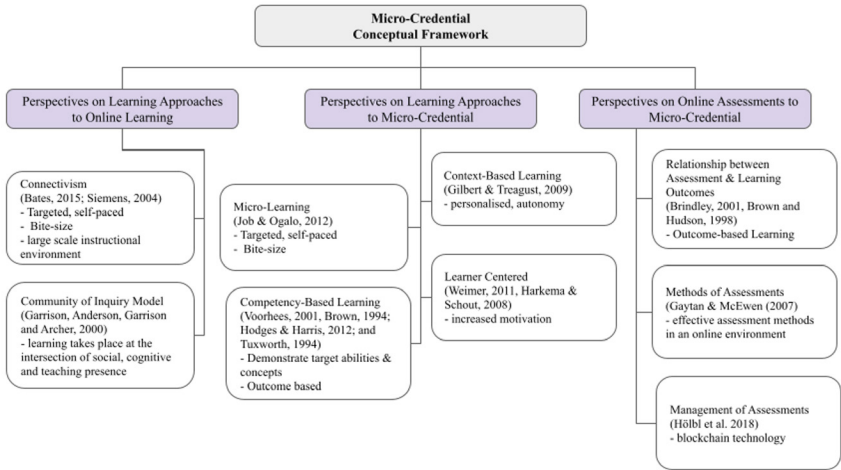
Figure 4: The Micro-Credential Conceptual Framework

In this initial consideration for the micro-credential conceptual framework, two important theories were considered on the perspectives for learning approaches to online learning; Connectivism (Bates, 2015; Siemens, 2004) and Community of Inquiry Model (Garrison, Anderson, Garrison & Archer, 2000). In addition, four theories were also considered on the perspective for learning approaches to micro-credentials; Micro-learning (Job & Ogalo, 2012), Competency-based Learning ((Voorhees, 2001, Brown, 1994; Hodges & Harris, 2012; and Tuxworth, 1994), Context-based Learning (Gilbert & Treagust, 2009) and Learner-Centered (Weimer, 2011, Harkema & Schout, 2008). Lastly, three aspects were considered on the perspectives for online assessments to micro-credentials; relationship between assessment and learning outcomes, assessment methods and assessment management.

CONCLUSION

The Micro-Credential Conceptual Framework was developed and will serve as a foundation and guideline for the next phase of the study which will be in the form of framework instantiation for developing a micro-credential. The conceptual framework includes literature review, and relevant theories on learning approaches to online learning and micro-credentials, as well as online assessment considerations with reference to micro-credentials. The outcome of the conceptual framework will be applied and validated in future studies.

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